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Cabletron sees a Bluer internetwork

By Skip MacAskill
Staff Writer

ROCHESTER, N.H. — With a broad sweep of its product brush, Cabletron Systems, Inc. last week painted a Blue migration path for users to follow when merging their SNA and multiprotocol LAN internetworks.

Taking a page out of the router vendors' manual, Cabletron unveiled a conversion module that lets its intelligent hub take in SDLC traffic from cluster controllers and other Systems Network Architecture devices and send the data over token-ring nets.

The company also rolled out enhancements that essentially make its Spectrum net management system a peer to IBM's NetView, enabling users to employ Spectrum's graphical user interface (GUI) and expert system engine to manage both SNA nets and Simple Network Management Protocol-based devices.

A key component of Cabletron's SNA strategy is the SNA Network Access Controller Media Interface Module (SNACMIM), which resides in the company's
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PHOTO ©1992 DANIELLE SWICK

IBM's Dick Anderson, Art Olbert, Thomas Aser and Bill Warner (l. to r.) at the company's SystemView product rollout in New York last week.

Firms target emerging net mgmt. applications mart

By Bob Brown
Senior Editor

BOSTON — Setting the pace in the emerging market for generic network and system management tools, Remedy Corp. last week rolled out here its second application, dubbed Health Profiler.

Remedy is one of a new breed of third-party software developers building applications that reside on or coexist with open net management platforms and are used to manage multivendor networks. Remedy's new Health Pro-

filer, as expected, is designed to provide users with "visual dashboards" that reflect the status of network devices (see story, page 8).

Other vendors in this market include: Metrix Network Systems, Inc., a Nashua, N.H., company that offers a set of net monitoring and analysis tools; ISICAD, Inc., an Anaheim, Calif., firm that makes an application that is used to manage physical network plants; and Networx, Inc., a Bellevue, Wash., start-up formed by
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IBM adds database tools to SystemView

IBM offers up OS/2-based platform and family of tools for managing SAA and other databases.

By Michael Cooney
Senior Editor

NEW YORK — IBM put some teeth in its SystemView system and network management strategy last week by introducing a family of products for managing distributed databases across enterprise nets.

Central to the announcement was the IBM SystemView Information Warehouse DataHub, a line of products that let users manage relational databases from IBM and, ultimately, other vendors. IBM's LANfocus family of distributed local-area network management products also made its formal debut (see "IBM doles out distributed LAN management goods," page 6).

"We want to move SystemView products into the open and distributed computing environments so customers can manage distributed databases... from multiple vendors," said Dick Anderson, IBM's networking systems marketing director. "These announcements should help users develop and implement sys-

tems management solutions."

DataHub products are the systems management tools for databases conforming to IBM's Dis-
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■ Guide to strategic purchase decisions zeroes in on LAN operating system selection. Page 77.

■ Network innovator strives to keep net rules simple. Page 103.

Group to link Windows to SNA services

By Wayne Eckerson
Senior Editor

REDMOND, Wash. — Twenty vendors led by Microsoft Corp. and IBM last week introduced a set of standard application program interfaces (API) for connecting Windows applications to IBM Systems Network Architecture net services.

Collectively called the Windows SNA API, the interfaces specify a standard implementation of five IBM SNA APIs for Windows and Windows NT platforms: High-Level Language API (HLL-API), Advanced Program-to-Program Communications (APPC), Common Programming Interface for Communications (CPI-C), LU 0 and Common Service Verbs (CSV).

The set of standard interfaces is designed to eliminate the multitude of APIs developers current-
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NETLINE



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TIMEPLEX AIRS LOW-END router, packet switch. Page 2.

START-UP OFFERS SNMP management tools for NetWare LANs. Page 4.

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NEW VERSION OF Microsoft LAN Manager to offer centralized server management, broader connectivity options. Page 4.

TEAMLINKS FROM DEC gets added groupware capabilities. Page 4.

IBM PROFFERS mainframe-like control for distributed LAN environments. Page 6.

MFS spins web of fiber to link metropolitan-area nets

By Bob Wallace
Senior Editor

OAKBROOK TERRACE, Ill. — In its first wide-area network venture, MFS Datanet, Inc. last week detailed plans to build an Asynchronous Transfer Mode (ATM) T-3 backbone to link its 14 metropolitan-area nets by mid-1993.

The backbone will enable the carrier to extend the reach of its existing local-area network interconnection offerings — which support speeds up to the 100M bit/sec Fiber Distributed Data Interface rate — and eventually let MFS offer other advanced data services.

"Putting the intercity portion of our LAN interconnection services in place represents a dra-

matic expansion of the high-speed LAN services we announced a year ago on the Houston network," said Royce Holland, president and chief executive officer of MFS.

Founded in 1988, MFS has spent \$250 million building and acquiring fiber networks in 14 cities. Its nets serve roughly 900 buildings, a figure Holland said will jump to 1,300 by the end of the first quarter of 1993, when new nets are brought up in Atlanta and northern New Jersey.

MFS is now investing tens of millions of dollars to provide long-haul links between those nets. Holland said he expects to have one or two users when MFS
(continued on page 102)

IBM offers first glimpse of router's performance

Claims internal tests of the 6611 show the device makes efficient use of local- and wide-area links.

By Maureen Molloy
Senior Writer

RESEARCH TRIANGLE PARK, N.C. — IBM last week revealed the results of internal performance trials of its fledgling router.

Although IBM began shipping the 6611 Network Processor last month, it has remained silent about performance metrics until now. The router had been delayed since June due to unspecified interoperability problems.

The tests indicate IBM's router matches the performance of other routers in its class.

"It can't match the perfor-

mance of a [higher end] Wellfleet Backbone Node or Cisco AGS+, so a user wouldn't be wise to deploy it in a large campus collapsed backbone network," said David Passmore, vice-president and service director at Gartner Group, Inc. in Stamford, Conn. "But the performance is more than adequate and will not pose a bottleneck in most applications."

"The tests show that the 6611 can use the local- and wide-area media as effectively as possible," said Jim Goethals, IBM marketing brand manager of routing products. "It can fill the Ethernet, to-

(continued on page 98)

FCC clears way for foreign carriers to better compete

Lifts restrictions, allows resale of switched services.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The FCC last week set the stage for lower prices and increased competition in the international services market by relaxing many regulations now imposed on foreign carriers operating in the U.S.

In a landmark decision, the Federal Communications Commission for the first time voted to allow a foreign carrier to enter the U.S. and resell switched services over international private lines. The FCC also voted unanimously to lift some of the tariff regulations placed on nondomi-

nant international carriers operating in the U.S.

It is hoped that the new rules will increase competition both by making it easier for foreign carriers to operate in the U.S. and by clearing away some of the stumbling blocks that prevented foreign countries from allowing greater flexibility for U.S. carriers operating there.

"In the next several years, international service rates are going to plummet," thanks to last week's decisions, said Mark Langner, an associate at TeleChoice, Inc., a consulting firm

(continued on page 97)

Timeplex offers low-end packet switch and router

By Jim Duffy
Senior Editor

WOODCLIFF LAKE, N.J. — Ascom Timeplex, Inc. last week introduced a low-end router and a low-end packet switch designed to tie branch offices of large companies into the corporate data center.

The Time/LAN Access Router is based on Intel Corp. i960 Reduced Instruction Set Computing (RISC) technology and supports up to two Ethernet or token-ring interfaces and three serial ports.

The company also rolled out the Timepac Branch Nodal Processor, an eight-port packet

switch that supports Systems Network Architecture/Synchronous Data Link Control, X.25, frame relay, Integrated Services Digital Network, and asynchronous and synchronous traffic.

Both products establish new entry points for Ascom Timeplex's routing and packet switching lines.

For routing, the previous low end was the Time/LAN 100 router, which supports as many as 12 Ethernet ports, six token-ring ports, a Fiber Distributed Data Interface port and as many as 12 wide-area network links.

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Briefs

First CDDI interoperability demo on tap. Cabletron Systems, Inc., Crescendo Communications, Inc. and Silicon Graphics, Inc. plan to conduct the first multivendor interoperability demonstration of the 100M bit/sec Fiber Distributed Data Interface technology implemented on copper wire at the INTEROP 92 Fall trade show in San Francisco later this month. The demo will feature interoperability of products supporting the MLT3 encoding scheme, which is due to become an ANSI standard.

Novell keeps its promises. Novell, Inc. this week is expected to keep the promises it made in March by releasing three new modules for its NetWare Global Messaging product. The modules will add support for the Simple Mail Transfer Protocol, which is popular with Unix and Transmission Control Protocol/Internet Protocol users; the Systems Network Architecture Distribution Services protocols used in IBM environments; and the X.400 protocol for Open Systems Interconnection-based messaging.

Congress earmarks funds for NSF. Congress last week passed the Scientific and Advanced Technology Act of 1992, which gives \$35 million to the National Science Foundation (NSF) to help colleges granting associate degrees to develop better programs in technical fields, such as telecommunications and electronics. The act also sets new guidelines for NSF, allowing the agency to fund networks used by organizations other than research and educational groups if it helps the networks support research and education activities.

PictureTel takes Notes. Lotus Development Corp. and PictureTel Corp. last week announced a joint development agreement under which PictureTel will integrate its videoconferencing technology with Lotus' Notes groupware software. The combination will enable Notes users to hold videoconferences from their desktop computers, a capability that PictureTel demonstrated for *Network World* last week. PictureTel declined to estimate pricing or availability.

UB buddies up with Novell. Ungermann-Bass, Inc. and Novell, Inc. today will announce a three-year, \$14 million OEM agreement whereby UB will resell and support Novell's NetWare Version 3.11 network operating system and NetWare RunTime. Both products will be available immediately from UB.

Under water. Torrential rains in the South flooded a Sprint Corp. network switch early Friday morning in Fairfax, N.C., knocking out service to users in most major North Carolina and South Carolina cities. The carrier lost 26 points of presence as a result. Sprint termed it "a significant outage." As of press time, the carrier did not know when it could fully restore service.

A BT North America-Syncordia merger? A source at BT North America who requested anonymity said the company may be merged in the near future with its Syncordia Corp. global outsourcing unit. The source said top officials at BT are considering a merger, a move that might eliminate the need for each unit to have its own sales force. BT last week announced a series of senior management changes "designed to help [BT] focus and coordinate efforts on its emerging global customer base." Syncordia has landed three user contracts since it was created last September.

CONTACTS



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AT&T, MCI launch legal battle over 800 services

Jostle for market position as competition heats up.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The battle over 800 services heated up last week as both AT&T and MCI Communications Corp. took legal actions aimed at helping them compete against rivals in the 800 marketplace.

MCI filed a formal complaint with the Federal Communications Commission concerning a long-simmering gripe about AT&T's 800 service marketing practices, while AT&T asked a federal court to either lift an FCC

ban that prohibits it from bundling 800 service with Tariff 12 or contract deals or impose a similar restriction on rival carriers.

What the ultimate outcome of either legal action will be is unclear since court appeals and FCC complaint proceedings often take two or more years to complete. But the filings are indicative of the intense pressure customers will likely come under as the March 3 deadline for 800 portability nears, bringing with it the potential to dramatically reshape the multibillion dollar market.

MCI's formal complaint alleges that AT&T is illegally using 15 different long-term marketing plans and promotions to lock-in users and prevent them from moving to other carriers once 800 numbers become portable. MCI claims that AT&T's marketing of 800 service violates provisions of the Communications Act of 1934 that require all carrier rates and practices to be just and reasonable.

MCI says that AT&T's 800 term plans throw users into a catch-22 — in order to get discounts on 800 services now, users must commit to long-term plans that will prevent them from switching carriers or potentially getting additional discounts stemming from 800 portability.

A user's "choice is to commit" (continued on page 100)

Microsoft to announce new version of LAN Manager

By Timothy O'Brien
West Coast Bureau Chief

DALLAS — Microsoft Corp. will announce tomorrow a new version of its LAN Manager network operating system (NOS) that offers centralized management capabilities and broader connectivity options.

Microsoft claims that wider protocol support and a new Windows-based multiserver management tool better position LAN Manager 2.2 for users looking to integrate local-area networks across an enterprise and as a powerful server for clients running Microsoft's upcoming Windows for Workgroups product.

Windows for Workgroups is Microsoft's new entry-level peer-to-peer networking product for Windows-based personal computers that will also provide client access to LAN Manager as well as Novell, Inc. NetWare servers.

Covering both ends

Dwayne Walker, director of

Windows NT and networking at Microsoft, said that with LAN Manager 2.2 and Windows for Workgroups, Microsoft is addressing the high and low ends of

Microsoft is addressing the high and low ends of the LAN market, recognizing Novell's hold on the departmental middle ground.



the LAN market, a strategy that recognizes market leader Novell's hold on the departmental middle ground.

LAN Manager 2.2 now offers a Windows-based, centralized management tool that gives LAN

users a way to administer multiple servers from a client workstation. Servers can also be managed from a remote workstation using a new release of Microsoft's Remote Access Services, Version 1.1, also to be announced tomorrow.

Microsoft will add a Windows Network Application Starter feature to LAN Manager 2.2 that allows Windows users to select an icon on their screen in order to start up applications on servers across the network. Closing the program ends the network connection, optimizing network use.

In addition, a feature called LAN Manager Print Station will allow any DOS or Windows workstation to be designated as a print server, giving users more flexibility in their printing requirements.

For better integration with IBM networks, LAN Manager will support the Data Link Control protocol, commonly used in IBM Systems Network Architecture and 3270 applications. Also, users running IBM's OS/2 2.0 client software will now be able to connect to LAN Manager servers.

On the WAN side

For wide-area networking, LAN Manager 2.2 will include Transmission Control Protocol/Internet Protocol extensions for server-to-server communications and remote dial-in support for X.25 networks.

Microsoft is only charging for server licenses, thereby eliminating workstation licenses. Therefore, LAN Manager 2.2's \$1,995 price reflects the new server pricing.

In addition, there are no longer any technical checkpoints on the number of workstations that can connect to the server.

LAN Manager 2.2 is expected to be available before the end of the year. □

Start-up offers SNMP tools to control NetWare LANs

By Joanne Cummings
Senior Writer

COLORADO SPRINGS — Start-up Network Edge, Inc. last week announced its first products — two software packages for managing Novell, Inc. NetWare LANs using the Simple Network Management Protocol.

The company's StationView and ServerView enable users to manage NetWare local-area networks from SNMP-based management platforms such as Hewlett-

Packard Co.'s OpenView or from DOS clients.

This gives users a standards-based alternative to Novell's NetWare Management System (NMS), which depends on Novell's proprietary Internetwork Packet Exchange (IPX) protocol to handle management data, according to analysts.

"It's a good approach," said John McConnell, an analyst at Infonetics Research, Inc. in Boulder (continued on page 96)

Scheduling added to Teamlinks

By Jim Duffy
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. and PowerCore, Inc. last week disclosed a joint development and marketing agreement to add scheduling capabilities to DEC's TeamLinks work group software, moving it squarely into the groupware fold.

Scheduling is seen as an important aspect of groupware because it allows users to access multiple calendars and schedules on-line in order to coordinate work. TeamLinks, which started shipping last month, allows Microsoft Corp. Windows-based workstations to access DEC Pathworks and All-In-1 servers for electronic mail, conferencing, document management and file-browsing applications.

This agreement adds "a key component of groupware" to TeamLinks, said Steve Martin, DEC's Office and Teamware applications marketing manager.

Analysts agreed. "If you don't have it, you just have glorified E-mail," said John Donovan of WorkGroup Technologies, Inc. in Hampton, N.H.

Indeed, scheduling is a feature TeamLinks users have been waiting for. "Scheduling is a major problem in any organization," said Francis Sulton, manager of end-user computing and support systems at Egelston Children's Hospital in Atlanta. "When they complete the integration, we'll go ahead and use that product."

The arrangement between DEC and PowerCore is long-term, according to both companies. The first phase of development will result in PowerCore's Network Scheduler 3 product running as an integrated TeamLinks

application by January. Network Scheduler 3 will connect to wide-area mail systems via TeamLinks X.400 and DEC MailWorks E-mail transports.

In addition to supporting Windows clients on Pathworks local-area networks, Network Scheduler 3 for TeamLinks will allow users on Novell, Inc. NetWare LANs to share calendars. DEC expects to ship a version of Pathworks that will natively support NetWare file-and-print services in the first half of 1993 ("DEC to improve Pathworks' integration with NetWare," NW, Feb. 10).

Network Scheduler 3 for TeamLinks will support Apple Computer, Inc. Macintosh clients by the second quarter of 1993. Martin said DEC hopes to ship a version of TeamLinks for Macintosh clients by then, as well.

The second phase will result in a gateway between Network Scheduler 3 for TeamLinks and the scheduling component of DEC's All-In-1 office environment by the second quarter of next year. This will allow TeamLinks users to schedule meetings and projects with DEC's installed base of five million All-In-1 users.

The companies are also evaluating other development and marketing opportunities combining their respective products.

Pricing for the product was not disclosed. □

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Corrections: The story "Sprint maps out frame relay, ATM game plan" (NW, Sept. 28), incorrectly credited Sprint Corp. as the first of the Big Three carriers to announce plans for frame relay to other countries. AT&T outlined plans in May to offer the service in Europe.

The story "VSATs poised for new internet role" (NW, Sept. 14), should have referenced Hughes Network Systems, Inc. features, not Hughes LAN Systems, Inc.

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IBM doles out distributed LAN management goods

Key to strategy is LANfocus Management/2 suite.

By Michael Cooney
Senior Editor

NEW YORK — IBM last week brought mainframe-like systems and network management capabilities to the local-area networking arena with the introduction of a products suite that gives LAN users powerful, centralized control over distributed LANs.

The key to IBM's new LAN systems and management strategy is the LANfocus Management/2 suite of software products, which will let users monitor and control network devices, operating systems, applications and software distribution while sharing net information with other IBM and non-IBM management systems.

"Instead of focusing SystemView on host systems, we are now focusing it on LAN systems," said Art Olbert, IBM's personal systems director for LAN systems. "We want to make it easier for users to manage LANs, whether they have a mainframe or not."

Previously known internally as IBM's Distributed System Management products, which the firm first discussed in an April briefing with *Network World*, the OS/2-based LANfocus Management/2 products include the central LANfocus Manage/2 and LANfocus View/2 products, plus client software packages dubbed LANfocus Enable/2, Agents/2 and Agents Extended/2.

The base OS/2 LANfocus Manage/2 platform is built on Hewlett-Packard Co. OpenView Network Management Server technology but now runs on OS/2

rather than Unix and includes IBM-specific extensions. It supports standards-based services for monitoring and controlling IBM and non-IBM devices on LANs, in addition to open interfaces to which users or third-party vendors can write applications for managing IBM OS/2, DOS, Windows and non-IBM clients.

LANfocus Manage/2 will use both the Common Management Information Protocol and Simple Network Management Protocol to communicate with IBM and non-IBM devices on the LAN.

LANfocus View/2, which is the software that provides a graphical representation of net resources and connections, runs on top of LANfocus Manage/2.

IBM also announced performance, configuration and fault management applications that run on LANfocus Manage/2.

LANfocus Monitor gathers and reports system and net performance statistics for the LANfocus Manage/2 platform. LANfocus Start/2 learns and stores data on clients and servers on the LAN.

LANfocus Fix/2 monitors network alerts generated by the LANfocus Agents. Users can predefine automated responses to such alerts or respond manually.

Also residing on the base platform is the new LANfocus NetView Tie/2 and Novell, Inc.'s NetWare Services Manager applications (see "Novell to support IBM's LANfocus Management/2," this page). Fourteen other vendors announced that their management applications will

run on the LANfocus platform.

The NetView Tie/2 software allows LANfocus and NetView to exchange network and systems management information and gives users the option of managing the LANfocus platform from a NetView host.

LANfocus Enable/2 is the base client software for OS/2, DOS and Windows personal computers that provides such management services as the interface to LANfocus Manage/2.

The LANfocus Agents/2 software resides on top of LANfocus Enable/2. It gathers client information on such elements as configuration, machine memory and on-board adapters, and reports it to the central LANfocus Enable/2 platform.

LANfocus Agents/2 Extended software will reside on IBM's LAN Server and OS/2 Extended Services Database Manager, enabling LANfocus Manage/2 to monitor those environments.

The other key IBM SystemView announcement was the introduction of its new software distribution tools, dubbed Configuration, Installation and Distribution (CID). CID tools let users copy, modify and update whole applications or operating systems and distribute the software across the LAN from the LANfocus Manage/2 platform.

CID software resides on the LANfocus Manage/2 platform and will let users distribute IBM and non-IBM software across the LAN without user involvement. It also includes facilities for tailoring software updates to individual machines.

IBM said more than 150 software vendors will make their products compatible with CID technology.

New versions of IBM's NetView
(continued on page 98)

IBM adds tools to SystemView

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tributed Relational Database Architecture (DRDA), which defines how IBM's Systems Application Architecture (SAA) databases exchange information. The SAA databases supported are OS/2 Database Manager, OS/400 database manager, DB2 on the MVS platform and SQL/DS for VM. DRDA is part of the larger IBM concept of Information Warehouse, which defines how IBM's databases will communicate with multivendor databases.

The DataHub product line revolves around the central OS/2-based DataHub/2 platform. It communicates with four other packages — DataHub Support/2, DataHub/400, DataHub/VM and DataHub/MVS — each of which runs on one of the respective SAA databases supported.

DataHub/2 features an object-oriented graphical monitor that displays the status of data transfers between DataHub-supported

way to monitor multiple local or remote databases through one central system, Davison said.

For now, DataHub products support only IBM's relational databases, but 15 other vendors, including Candle Corp., Legent, Inc., Boole & Babbage, Inc. and BMC Software, Inc., will be porting their database management tools to the DataHub platform.

"Users will have a choice of database management tools available on one platform," said Bill Wood, vice-president of the solutions management group for Candle. "The product should facilitate the growth of distributed databases."

Analysts said the DataHub family fills out some missing links in IBM's database strategy, but more work remains.

"The announcements mean more meat on SystemView's architecture, which had been pretty skimpy," said Atul Kapoor, a principal with Kaptronix, Inc., a consultancy in Haworth, N.J. "It will finally give users some real SystemView products."

According to Anura Guruge, an independent consultant based in New Ipswich, N.H., users should be a little skeptical about DataHub because it does not yet support non-IBM databases. "SystemView is still too much of a 'strategy,'" he said. "IBM needs to show more products and fill in pieces of the architecture."

DataHub products will begin shipping March 31. The DataHub/2 software is priced at \$2,000, and DataHub/2 Tools costs \$4,000. DataHub/400 prices range from \$1,100 to \$29,150. DataHub/MVS prices range from \$2,225 to \$46,900. DataHub/VM will run \$4,030 to \$140,650. All pricing depends on the size of the processor.

IBM also extended the SystemView umbrella over a new release of its AOC/MVS platform. AOC/MVS is a NetView application that automates responses to alerts and user-defined performance thresholds from devices — such as a cluster controller or direct-access storage device — linked to a net.

AOC/MVS Release 2 can now use objects stored in NetView Version 2 Release 3's Resource Object Data Manager (RODM) to respond to alerts from supported devices. And AOC/MVS alerts are now displayed on NetView's Graphic Monitor Facility, which graphically represents the objects stored in RODM.

IBM said the new release should let users see and respond to network performance problems more quickly.

AOC/MVS Release 2 will be available Aug. 27, and pricing will range from \$11,340 to \$137,850, depending on the size of the mainframe. ■

“Users will have a choice of database management tools on one platform.”



databases. With an optional DataHub Tools feature, database administrators can also issue commands to DataHub databases. For example, the central DataHub/2 could restart disconnected users or copy objects from one database to another.

Using DataHub/2, users should be able to spot and quickly solve problems such as communications bottlenecks, avoiding performance problems and database downtime, said Brant Davison, an IBM program manager.

For the first time, database administrators can also monitor individual units of work, which are sessions between databases. In the past, administrators couldn't pinpoint database problems to a particular session and had to take the entire database down to troubleshoot it, analysts said.

DataHub tracks the available resources on all supported databases and stores the information on its own database. It provides capacity planning information and can automatically track changes made to databases throughout the enterprise.

DataHub/2 will also let users centralize the management of local and remote distributed databases. In the past, there was no

But according to Navindra Jain, vice-president and general manager of Novell's network management and internetworking products divisions in San Jose, Calif., "Most of the OS/2 demand was within IBM environments."

On the Novell management side, NSM Version 1.1 now includes locational network mapping, automatic discovery and mapping of Internet Protocol and Internetwork Packet Exchange (IPX) routers, as well as the ability to manage Simple Network Management Protocol-compliant devices.

Previously, all of those features were separately priced options.

NSM Version 1.1 is available now at the same price as the previous version, \$4,995.

— Caryn Gillooly

Novell to support IBM's LANfocus Management/2

NEW YORK — Novell, Inc. last week announced support for IBM's new LANfocus Management/2 platform and said it has licensed its OS/2-based net management products to Big Blue.

Novell also brought out Version 1.1 of its NetWare Services Manager (NSM) management application, which now includes previously optional features.

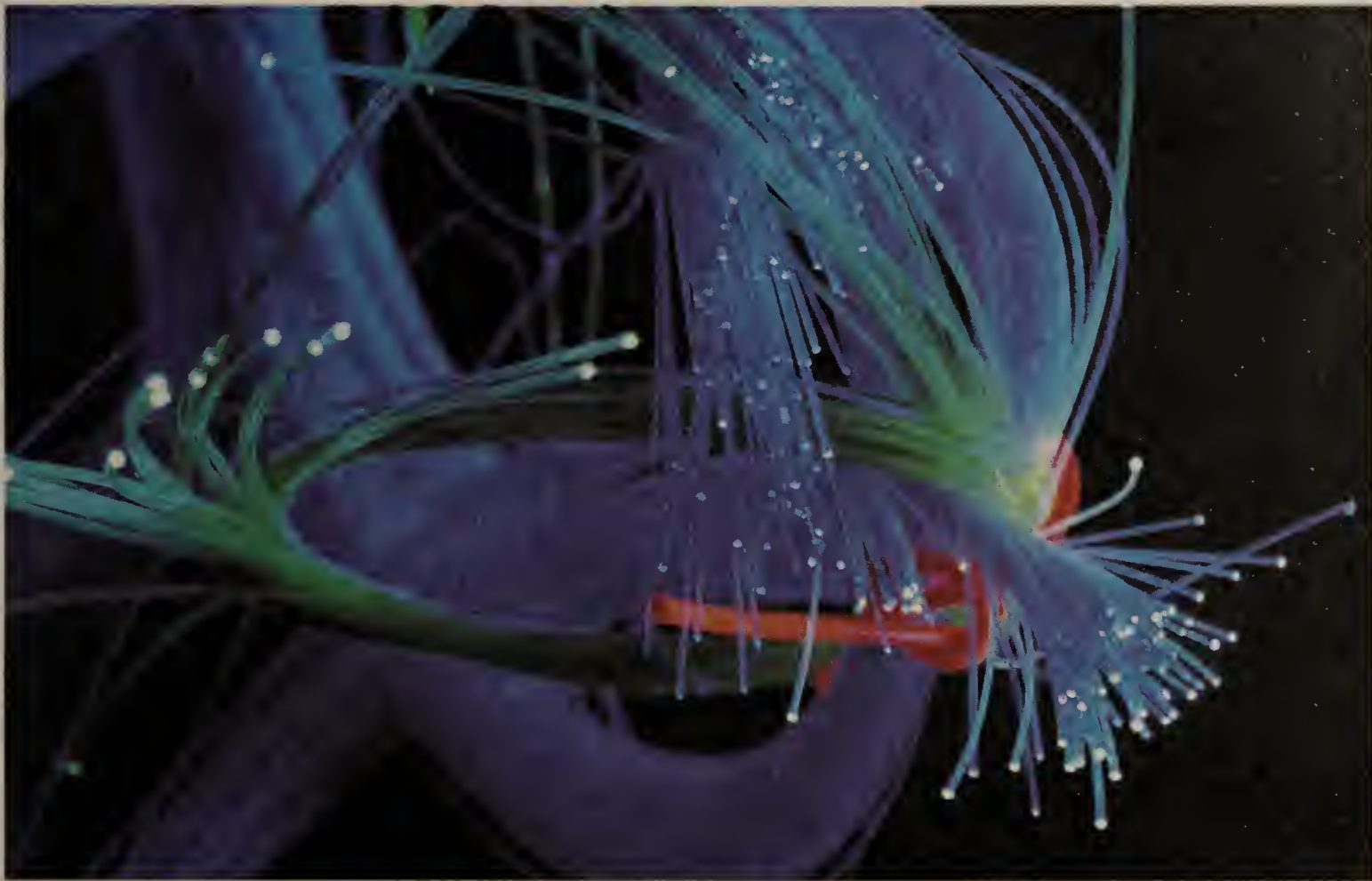
Under an agreement between the two companies, Novell's NetWare Management Map for OS/2 will be integrated into IBM's new LANfocus Management/2 system and IBM will take over sole sales and support

responsibility for the product.

The NetWare Management Map automatically discovers and maps network connections and devices, and is the base upon which other NetWare management applications reside.

In addition, Novell's NSM (OS/2 Option) will now be marketed by both Novell and IBM. The NSM (OS/2 Option) is basically a version of Novell's NetWare management application for OS/2.

Previously, Novell offered its NSM (OS/2 Option) and the NetWare Management Map for OS/2 as part of its NetWare Management System platform.

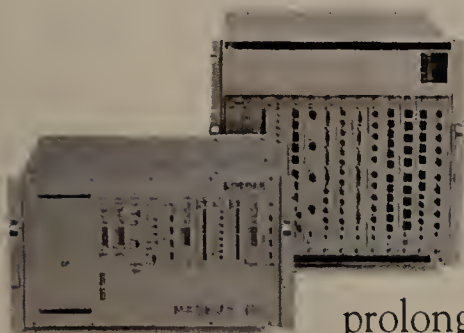


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Firms target net mgmt. mart

continued from page 1

ex-Boeing Computer Services employees that plans to show its first product — a trouble-ticketing and problem-resolution application called Paradigm — at INTEROP 92 Fall.

The dramatic shift by users away from proprietary management systems to common platforms, such as Hewlett-Packard Co.'s OpenView and SunConnect's SunNet Manager, has given rise to this net management application market, an occurrence welcomed by users.

Until now, their primary options were building their own applications — an expensive proposition — or settling for proprietary management applications from each of their equipment vendors.

"Users absolutely need these third-party products to manage networks that are quickly getting out of control," said Mark Tillot-

son, corporate network manager for Conner Peripherals, Inc., a San Jose, Calif., manufacturer of hard disk drives. "We've had the need for a while, but the tools just haven't been readily available."

"You're going to see a lot more Remedies, and we're encouraging that," said Denis Yaro, general manager at SunConnect. "Just as the application sales depend on platform sales, platform sales are dependent on applications availability."

Model vendors

The market for net management applications owes much to the growing acceptance of a net management model promoted by the Open Software Foundation, Inc. (OSF), Remedy and others.

It calls for users to standardize on open management platforms, such as those that will conform to the OSF's Distributed Management Environment (DME) when it becomes available next year, according to Larry Garlick, Remedy's president and chief execu-

tive officer.

It also calls for use of two application types on the platforms: device-specific management applications from equipment vendors and generic applications from independent software developers.

David Mahler, Remedy's vice-president of marketing, was not totally convinced a year ago that this net management model would be accepted. As a result, Remedy hedged its bets by building its first product, the Action Request System for automated trouble-ticket reporting, to run on open management platforms or by itself, he said.

But there was no hedging when the firm designed Health Profiler. Convinced that open platforms have been accepted by users, Remedy designed its new product to be "open platform-dependent," Mahler said.

There's plenty of proof that the platform model has been accepted:

■ HP and SunConnect have reported big increases in platform license shipments this year. HP, for example, expects to ship twice as many OpenView licenses this year than in the past three years combined.

■ Many equipment vendors, including Cisco Systems, Inc., are moving away from their own management platforms to build device-specific applications for common management platforms. These vendors are also teaming

with third-party application developers.

■ Third-party application vendors such as Remedy, which has been selling products for less than a year, and Metrix expect to show profits this year.

The platform model is catching on because it is good for users as well as vendors, said Bill Gassman, Digital Equipment

Corp.'s marketing manager for net management. "Building a platform is expensive," Gassman said. "Even a company our size can't afford to do all the applications."

SynOptics Communications, Inc., a Santa Clara, Calif., hub vendor, has been particularly active in working with application vendors to integrate products from both Remedy and Metrix into its network management portfolio.

"We're building the hooks into these new applications," said Karen O'Neill, a product-line manager at SynOptics.

Christopher Baum, a senior analyst at DataPro Information Services Group, a Delran, N.J., consulting firm, said equipment vendors have always considered building network management applications "a necessary evil," not a money-maker. "They used to have to build the whole system, but now they don't need to," he said.

Team spirit

The cooperation among the

system, equipment and application vendors will result in greater options for users, Gassman said.

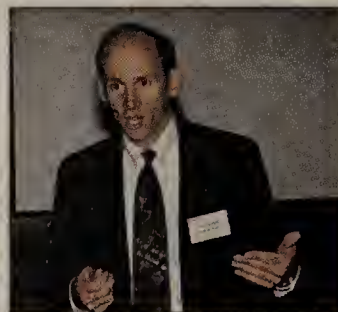
"The platform vendors provide the view from 30,000 feet, whereas the applications let users zoom in at many angles," he said. "The platform vendors can collect alarms but not correlate them like the applications can."

Chris Slatt, president and CEO of Networx, said his company will focus on providing multivendor net management applications for management platforms that provide as much automation as possible.

"Coming from the user side, we know that users want more automation," said Slatt, who previously headed up the network management system and services group at Boeing Computer Services, which provides network services to The Boeing Co. as well as other companies.

Applications are further being improved, thanks to growing cooperation among the application vendors themselves. As a result of work between Remedy and Metrix, users can log a Remedy trouble ticket that will automatically launch a Metrix protocol analyzer, according to Matthew Russell, vice-president of marketing at Metrix.

Future prospects for independent net management application vendors are tremendous since most of the major network management platform vendors plan to migrate to the OSF's DME. That means application vendors will have fewer application program interfaces to write to, enabling them to get applications to market quicker. ■



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Larry Garlick

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I certify that the statements made by me above are correct and complete.

Pat Walker
Traffic Manager

'Visual dashboard' debuts

BOSTON — As expected, Remedy Corp. last week introduced here its second product, a net management application that provides users with what the company describes as "visual dashboards" that reflect the status of network devices.

Remedy's Health Profiler is designed to let users compare the real-time status of devices and applications with normal status based on historical data ("Remedy to offer mgmt. 'dashboard,'" NW, Sept. 28).

By providing users with easy-to-read data in the form of meters, strip charts and other graphics, Health Profiler shields users from large volumes of complex and raw statistics.

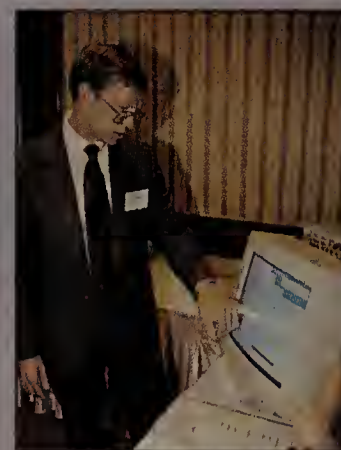
Health Profiler features two major components — views and reports. Views are the graphical representations of real-time data, while reports are based on historical performance. It fea-

tures a library of ready-to-use views of net devices but lets users build customized views, too.

The application is designed to run on net management platforms, such as SunConnect's SunNet Manager and Hewlett-Packard Co.'s OpenView, and work with the element management systems those platforms support. Like Remedy's Action Request System for trouble ticketing, Health Profiler offers generic features for all element managers.

Vendors pledging to integrate Health Profiler into their offerings include: platform providers such as Digital Equipment

Corp., HP and SunConnect; equipment vendors including Cabletron Systems, Inc. and Wellfleet Communications, Inc.; and third-party application vendors, including Metrix Network Systems, Inc.



PHOTOGRAPHY © 1992 JOHN THOMPSON

Dave Mahler

Health Profiler will be available for SunNet Manager in December, for OpenView in 1993, and other platforms after that, according to Remedy.

The Health Profiler real-time view builder and display tool, as well as the history module and

report writer offering are each priced at \$4,000, or \$6,000 with an embedded SQL database. Additional client licenses cost \$2,500, or \$3,500 with the database.

— Bob Brown

A man with a mohawk hairstyle, wearing sunglasses and a black leather vest over a dark shirt, sits at a dining table. He has his arms crossed and is looking towards the right. Two business professionals, a man and a woman, are seated across from him, looking at him. The table is set with white plates of food, silverware, and glasses. The background is dark and out of focus.

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UDS brings more to the table in the V.32 *bis* modem game



Modems that comply with the CCITT V.32 *bis* recommendation (and there are lots of them) share some common characteristics: 14.4 kbps basic rate, with compressible automatic fallback speeds; V.42 *bis* and MNP® level 5 data compression; sync or async full-duplex operation over two- or four-wire circuits and Hayes "AT" auto-dialing.

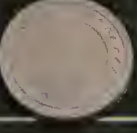
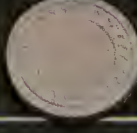
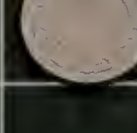
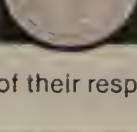
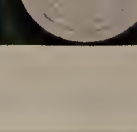
As these similarities drive value-conscious modem buyers to look beyond the common features, the search for added performance advantages brings them to the UDS V.3229.

In addition to the "standards," UDS offers a suite of features—automatic dial back-up, remote configuration capability, call security etc.—that is simply not available in competitive models.

If you're a modem buyer who understands that there's more to value than just price, UDS will happily rig the V.32 *bis* game in your favor.

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Telebit T3000	57.6K						

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DATA NET ARCHITECTURES

NETWORK ARCHITECTURES, DATA NETWORK EQUIPMENT, STANDARDS AND ENTERPRISE NETWORK MANAGEMENT

Worth Noting

“If a vendor's products are so futuristic that the company goes broke between now and the time they're useful, the company and its products don't do anyone much good.”

Dick Boyle
Program director for local-area communications service
Gartner Group, Inc.
Stamford, Conn.



“The [business units] we have today are not sufficiently customer-focused.”

Robert Palmer
President
Digital Equipment Corp.

DEC reorganizes network division as Palmer steps in

Changes will focus efforts on user requirements.

By Jim Duffy
Senior Editor

MAYNARD, MASS. — Digital Equipment Corp. is reorganizing its networking product development and marketing activities as part of a sweeping companywide realignment.

The reorganization comes as Robert Palmer takes over as president and chief executive officer of the computer maker, which lost \$2.8 billion and slashed some 10,000 positions in fiscal 1992. Palmer, who assumed his post two weeks ago, succeeds DEC founder Kenneth Olsen, who had been the company's CEO for its entire 35-year history.

The retooling of DEC's Networks and Communications division is intended to position the company's networking products as components of a comprehensive system for a particular customer requirement, rather than as an array of disparate, disjointed equipment.

Without referring specifically to the Networks and Communications division, Palmer said DEC's business units “will not have the same character and makeup of the business units we have today because the ones we have today are not sufficiently customer-focused. These will have more of a marketing direction, [and] they will have more autonomy in order to address the opportunities” they are chartered to pursue.

According to DEC, details of the reorganization are still being worked out, but under the new alignment, DEC is looking to structure its Networks and Communications division into three groups: Private Networks, Public Networks and End Systems Net-

works.

Private Networks will include mostly customer premises network hardware, such as IBM Systems Network Architecture gateways, routers, bridges, switches, servers, and local-area network controllers and concentrators.

Public Networks will include products and services tailored to

“The business units will have more marketing direction, [and] they will have more autonomy.”



telecommunications, cable television companies and wireless networking. This group will also oversee DEC alliances with companies in these industries.

End Systems Networks will include research, development and marketing of communications software, such as Distributed Computing Environment software obtained from the Open Software Foundation, Inc. and DEC's Advantage Networks, which includes DECnet, DECnet/Open Systems Interconnection and TCP/IP Services products.

Analysts said the restructuring could make DEC a more competitive networking vendor by helping it better target particular market requirements. But DEC still has to convince users that its products are optimal for linking

(continued on page 44)

McData covers ESCON mart from both ends

New software, hardware helps Enterprise System Connection users and non-ESCON users alike.

By Michael Cooney
Senior Editor

BROOMFIELD, Colo. — McData Corp. has rolled out an IBM Enterprise System Connection (ESCON)-compatible channel adapter and software for its SNA cluster controller, along with a new fiber optic-based mainframe channel extender.

The new channel adapter is intended to offer an inexpensive way to migrate McData controllers from existing bus-and-tag links to ESCON fiber-optic technology while preserving investments in existing equipment. And the new 5044 channel extender lets users exploit fiber technology without investing in ESCON.

ESCON is IBM's high-speed fiber-optic mainframe channel architecture that supports channel speeds of 10M byte/sec, up from bus and tag's 4.5M byte/sec, or 17M byte/sec with IBM's Extended Distance Feature (XDF).

ESCON also extends the maximum distance between a controller and a mainframe from 400 feet to almost two miles, giving users increased net configuration options. With XDF, the distance

between controllers and the mainframe can be almost 26 miles.

McData's ESCON channel adapter works with new Release 3.0 software for the company's IBM 3174-compatible LinkMaster 7100 cluster controller Models 10L and 20L. The new board and software is available in new 7100s or can be added to existing units for \$8,000.

In contrast, IBM's 3174 users seeking ESCON support must buy new controllers, Models 12L or 22L, for at least \$17,000.

The 7100 is rack-mountable and supports any mix of up to four Systems Network Architecture or non-SNA hosts. IBM 3174s support a maximum of three host connections. The 7100 Model 20L supports 64 attached coaxial terminals and 10 ASCII devices, and the Model 10L supports 128 coaxial and 34 ASCII devices.

The Model 10L supports two host channel adapters, letting users run either two ESCON channels or one ESCON and one bus-and-tag channel simultaneously.

(continued on page 30)

Wall Data broadens LAN support for SNA gateway

By Jim Duffy
Senior Editor

REDMOND, Wash. — Wall Data, Inc. recently brought out a new version of its Windows-based Systems Network Architecture gateway that allows users to access IBM mainframes from TCP/IP, NetWare and NETBIOS-based networks.

At the same time, Wall Data unveiled an application development kit that allows software developers to build Windows-based applications that share data with IBM mainframes using IBM's Advanced Program-to-Program Communications sessions.

Version 2.0 of Wall Data's Rumba Gateway System software adds Transmission Control Protocol/Internet Protocol and No-

vell, Inc. Internetwork Packet Exchange (IPX) protocols to the Network Basic I/O System local-area networks it currently supports. Version 2.0 also now supports third-party 3270 DOS clients, such as those from IBM, Attachmate Corp. and Digital Communications Associates, Inc., as well as Wall Data's 3270 emulator for Windows and OS/2 workstations.

Support for third-party DOS 3270 emulators is intended to allow users to maintain their investments in older emulation software when they purchase Rumba, Wall Data said.

With Version 2.0, for example, users of DOS 3270 emulators on TCP/IP networks can now access

(continued on page 30)

Data Packets

Walker Richer & Quinn, Inc. of Seattle last week said it will come out with X terminal-emulation software for Microsoft Corp. Windows workstations in the first quarter of 1993.

The software, called Reflection X, will allow Windows users on Transmission Control Protocol/Internet Protocol networks to access X-based data and applications on computers from Digital Equipment Corp., Hewlett-Packard Co. and other vendors that support the terminal standard.

Walker Richer & Quinn licensed X technology from AGE Logic, Inc., a San Diego-based developer of X software.

Pricing for Reflection X will be between \$495 and \$595, Walker Richer & Quinn said.

The Wollongong Group, Inc. next month will ship Pathway Access 2.1, software that enables DOS, Windows and Macintosh clients on a Transmission Control Protocol/Internet Protocol network to access applications on IBM, Digital Equipment Corp. and Unix systems.

(continued on page 12)

Brixton announces new gateway, multivendor platform strategy

SNA-to-Unix gateway can handle up to 500 3270 devices.

By Michael Cooney
Senior Editor

CAMBRIDGE, Mass. — Brixton Systems, Inc. last week announced a new gateway that lets Systems Network Architecture users access Unix applications on a

TCP/IP net and disclosed plans to port its entire line of SNA-to-Unix connectivity wares to more Unix platforms.

The company announced it is moving its BrxLink line of SNA-to-Unix products to additional multivendor platforms, includ-

ing IBM's RISC System/6000 and Hewlett-Packard Co.'s HP 3000 and HP 9000 Series systems. It also unveiled software that supports links between Transmission Control Protocol/Internet Protocol and frame relay nets.

The new products are designed to give users more choices for how to link their SNA and TCP/IP environments.

The new BrxUnix Gateway is Unix-based software that lets 3270 users on an SNA net access applications on Unix boxes linked to a TCP/IP net.

The software resides on a Unix platform

linked to a token-ring net. The 3270 user can access the gateway through a 3174 cluster controller linked to a token-ring local-area network on an SNA net. The gateway can handle as many as 500 3270 devices and sessions. However, Herb Rush, president of Brixton, said he expects that limitation to be removed when the system is ported to other machines, such as the RS/6000.

"The 3270 user can then execute the client/server-oriented applications residing on the Unix box," Rush said.

The firm's new frame relay software, BrxFR, runs on Unix machines and wraps data from TCP/IP applications, such as file transfer and electronic mail, in frame relay packets. The software uses existing serial ports in Unix workstations to support data transmission speeds up to 64K bit/sec.

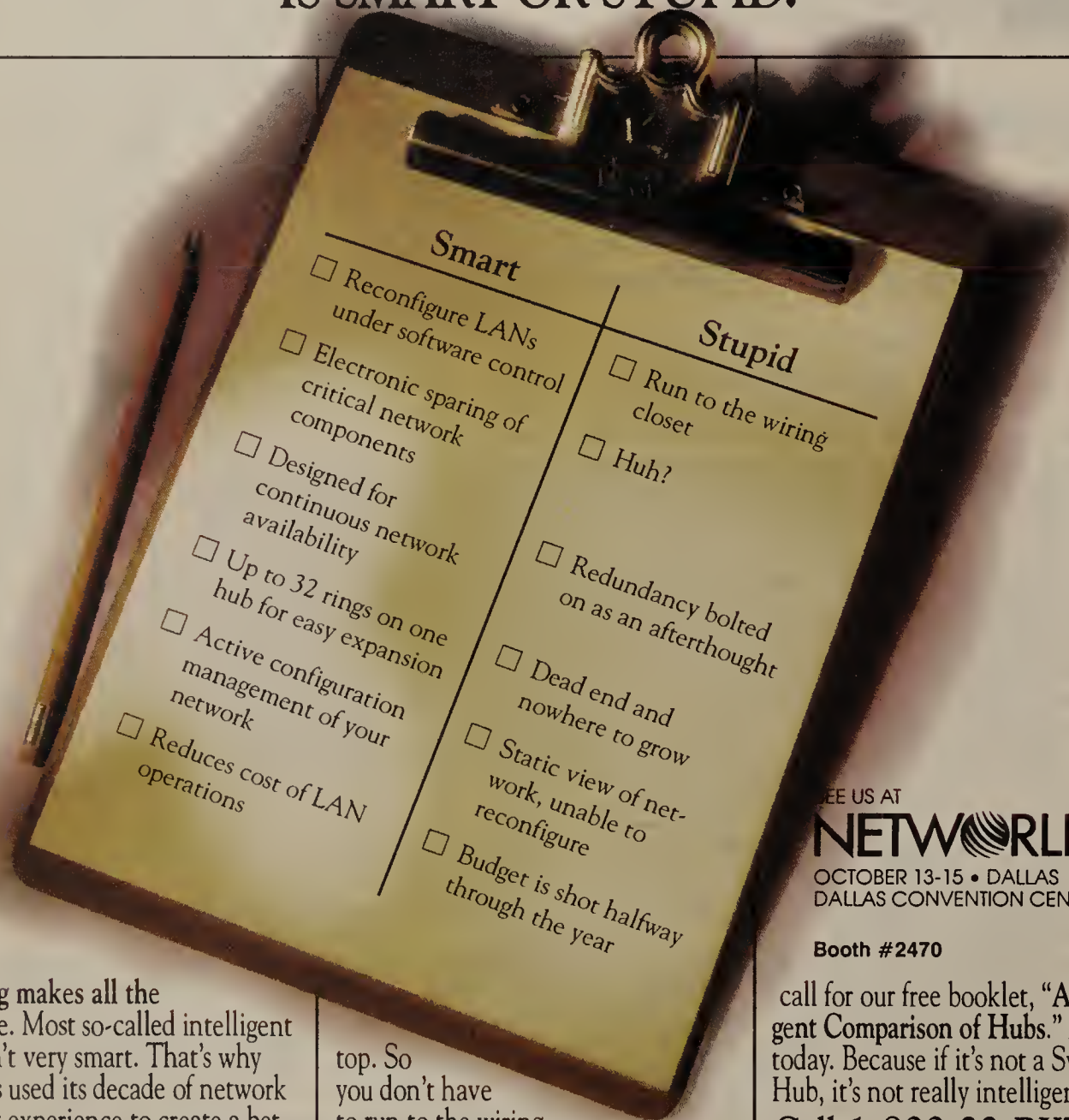
The company also plans to make its BrxLink line of 3270 emulation, gateway and router software available on more vendors' Unix machines.

"We will be making our line of communications products available on all of the industries' major Unix platforms," Rush said. "This strategy will enable users to use any machines to gain LAN and WAN access to IBM mainframe applications over the SNA network."

The BrxLink products are available now on IBM's RS/6000 and HP's 3000 and 9000 platforms. They also work with Unix Systems Labs' version of Unix for 386 and 486 platforms.

BrxUnix Gateway will be available Oct. 28 for about \$10,000. BrxFR is available now for \$995. ■

HOW TO TELL IF AN INTELLIGENT HUB IS SMART OR STUPID.

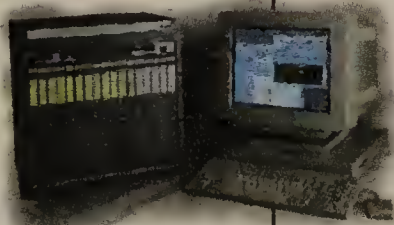


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Circle Reader Service #59

Data Packets

continued from page 11

Pathway Access 2.1 features a common user interface for Windows and Macintosh clients with point-and-click Telnet, File Transfer Protocol and network printing services.

In addition, the new version emulates a wider range of terminals than does Pathway Access 2.0.

Pathway Access 2.1 is priced at \$395 per single-user license. Versions for OS/2, DEC VMS and OpenVMS, and IBM AIX workstations will be available in the first quarter of 1993.

Enterprise Data, Inc. of Parsippany, N.J., recently added automatic data backup facilities to its LU 6.2-based Upstream backup-and-restore product for local-area network servers and clients linked to IBM MVS mainframes.

Upstream Version 2.0 runs as a VTAM application and now can be linked to IBM's Automated Console Operation software to automatically back up, restore or distribute updated files and data to token-ring or Ethernet LAN users supported by the mainframe.

Upstream consists of a mainframe and OS/2 or DOS workstation component that transfer data to and from each other over LU 6.2 sessions.

Upstream Version 2.0 is available now. Prices vary according to the number of servers and clients supported.

For example, the price for one server is \$14,000. ■

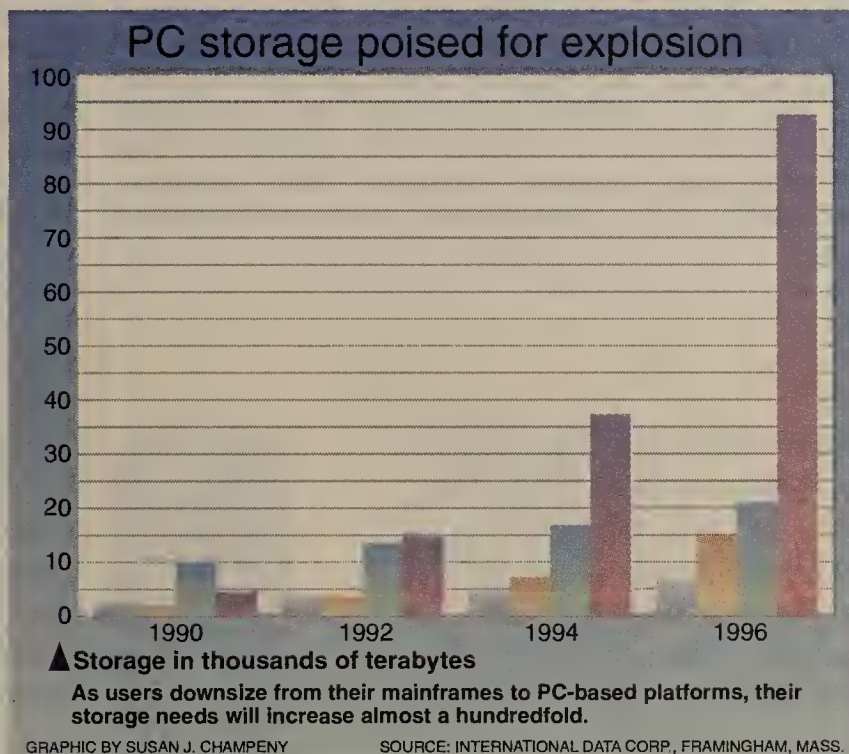
LOCAL NETWORKING

LAN HARDWARE, NETWORK OPERATING SYSTEMS AND LAN MANAGEMENT

Worth Noting

“Locks on the doors only keep your friends out; your enemies have very big hammers.”

Tom Henderson
President
Corporate Networks
Indianapolis
Commenting on network security



Firm offers high-end mass storage system for LANs

Analysts see market taking off as LANs grow.

By Caryn Gillooly
Senior Editor

IRVINE, Calif. — As LANs become larger and more mission-critical, users are fast needing larger and more fault-tolerant mass storage capabilities. Enter Sanyo Icon.

Targeting high-end customers, Sanyo Icon has introduced a new line of high-performance RISC-based intelligent disk subsystems designed for use on local-area networks.

The new products are all part of the LANser Multiple RAID Extended (MRX) line, a combination hardware/software subsystem that offers mass storage capabilities with three Redundant Array of Inexpensive Disks (RAID) levels.

With the new line, users will be able to get mainframe-sized, fault-tolerant on-line storage capacity on their LANs, without sacrificing much in terms of performance.

“This is an incredible product,” said Seth Traub, storage market analyst at International Data Corp. (IDC), a research and consulting firm based in Framingham, Mass. With LANser MRX, he said, users can back up a “massive network” of file servers and terminals for a low price.

The subsystem comes in four models — the LANser MRX100, MRX300, MRX500 and MRX500FT. Each has its own Reduced Instruction Set Computing (RISC)-based central processing unit, an

80M byte/sec internal bus and 16 Small Computer System Interface (SCSI) channels — each with its own processor — supporting as many as 12 file servers. The system supports a variety of personal computer and network operating systems such as OS/2, Unix, Banyan Systems, Inc.’s VINES and Novell, Inc.’s NetWare.

At the low end, the MRX100 supports up to 128M bytes of system cache, with future expansion of up to 512M bytes, and supports as many as four 1.6G-byte disk drives, said James Christie, senior vice-president at Sanyo Icon, based here.

At the high end, the MRX500FT has dual RISC processors. Although offering the same cache capabilities as the MRX100, the MRX500FT cabinet can house as many as 91 SCSI drives on each side, providing more than 145G bytes of formatted, duplexed disk storage.

Because each model is a stand-alone device with its own processor, the LANser line not only provides fault-tolerant mass storage but does so without effecting server performance, according to Christie.

“Usually, if a drive fails, the server is responsible for reconfiguring it,” Christie said. However, because it has its own CPU, “this product does the reconfiguring instead of the server.”

Each also comes standard with RAID 0 capabilities for disk strip-
(continued on page 14)

Bridging the security gap in NetWare nets

Novell vows to find solution to NetWare security threat, while net mgrs. search for a quick fix.

By Jan Jacobs
Special to Network World

Seasoned engineers at Novell, Inc. have been working overtime this week, trying to fix security holes in NetWare.

The recently discovered threat to NetWare security is forcing network administrators worldwide to reassess their network’s vulnerability to intrusions. The threat was discovered by a student of Leiden University in the Netherlands three weeks ago (“Novell users face threat to security,” *NW*, Oct. 5).

So far, Novell has not come up with a software solution to protect users of its 3.11 and 2.2 NetWare products from the potential intrusions. However, in a statement released last week, Novell said it will come up with security enhancements to minimize the risk of unauthorized access to NetWare networks.

“The company has given the matter top priority,” said Ray Noorda, chairman and chief executive officer of Novell.

Despite last week’s Novell statement, many network administrators are puzzled. They must find the exact nature of the security threat and a temporary solution until Novell comes up with a fix.

The original Leiden University program enables any user with an account on a NetWare server to take over the access rights of any other user on that server, even the supervisor. The most important restriction is that the program user can only assume the rights of users currently logged on to the network.

After first being informed about the Leiden program three weeks ago, Novell released a software enhancement for both NetWare 2.2 and 3.11, which Novell claimed countered the treat. That enhancement, or patch, appears to be a quick and dirty solution.

Programmers working independently from the Leiden group have shown that although the Novell fix (called SECUREFX.NLM or SECUREFX.VAP) beats the Leiden hack program, it is vulnerable to another kind of attack.

The basic flaw exploited by the Dutch programmers is the lack of authentication at the packet level in current versions of NetWare. When a user, such as the supervisor, logs on to the network, that person’s access privileges are determined through password authentication. That initial authentication determines what a user can do for the rest of the session,
(continued on page 14)

Remote users can now phone home

By Maureen Molloy
Senior Writer

CAMBRIDGE, Mass. — Shiva Corp. last week announced two multiport servers that give remote or traveling PC and Macintosh users access to corporate LAN resources.

Shiva’s LanRover/E for NetWare and LanRover/E for AppleTalk Remote Access let remote users dial into NetWare and AppleTalk local-area networks via standard telephone lines to access resources such as electronic

mail, file servers, databases and groupware as if they were on a local node on the LAN.

“The advent of a more mobile work force — comprised of salespeople, telecommuters and workers in decentralized offices — is creating an increased need for remote access,” said Jeremy Duke, an analyst at Dataquest, Inc., a consultancy located in San Jose, Calif. “Shiva has a cost-effective solution for this need.”

Both LanRover/E units connect directly to either a thick, thin or twisted-pair Ethernet LAN and are available in four- and eight-port versions, enabling as many as eight users to dial into the network simultaneously.

Each port connects to a modem and can support speeds up to 64K bit/sec.

(continued on page 14)

Netnotes

Compaq Computer Corp. last week brought out two personal computer server lines the company says will offer a combination of high performance and low price.

At the high end, Compaq unveiled the Compaq SystemPro/XL line, designed to function as either large-scale file servers or to run critical applications such as database management. Each machine in the SystemPro/XL line comes with two 50-MHz Intel Corp. 486 processors, each with 256K bytes of cache memory.

Differentiating the XL from other SystemPro models, however, is the new line’s TriFlex System Architecture under which each subsystem in the machine has its own bus. The architecture provides for a 64-bit processor bus, a 128-bit memory bus and a 32-bit Extended Industry Standard Architecture I/O bus.

Compaq Insight Server Management software provides the servers with Advanced Error Correction Code Memory.

At the lower end, Compaq also brought out its new ProSignia line, positioned as high-speed file servers. Pricing for the ProSignia starts at \$2,699 for the entry-level 33-MHz 486-based Model 1/EL. Prices for fully configured machines start at \$4,499.

Pricing for a fully configured SystemPro/XL starts at \$13,999. All models are available now. ■

Firm offers high-end mass storage system

continued from page 13

ing, RAID 1 capabilities for disk mirroring or disk duplexing, and RAID 5 capabilities for interleaved parity (where volumes of a disk are written to several different disks).

Unlike other RAID systems, however, the disks can be set up in a variety of RAID configurations. For example, the administrator can configure some of the disks to provide RAID 0 fault tolerance, while others can be configured to provide RAID 5 capabilities.

This can be particularly helpful because, although RAID 5 provides a high-level of fault tolerance, it also causes the system to take a major performance hit. Some customers, therefore, might want to set up only their most critical data for RAID 5, while setting up other data under different RAID levels.

According to analysts, this is one of the features that sets the LANser line apart from other company's offerings. "The most incredible thing about this is its configurability; you can configure this any way you want," IDC's Traub said.

Although the market for high-end, fault-tolerant mass storage systems is still in its infancy, there are customers that need these capabilities today.

One example would be in the health care industry, Traub said, where doctors or

medical suppliers need access to massive records instantly.

But as more customers move their mission-critical applications down from mainframes to LANs, this type of system will become a necessity.

"The market will really start to take off in the middle of next year," Traub said (see graphic, page 13). "We'll start to see volume shipments then."

LANser MRX models are available now. A base MRX100 model has a starting price of about \$30,000, while a base MRX500FT model starts at \$75,000. 

Bridging the security gap in NetWare nets

continued from page 13

creating the possibility for a user with few privileges to hijack a connection between a more privileged user and the file server.

The Dutch students wrote a program that is able to send a packet with a fake source address on the network to the file server. In other words, the students' program uses a session with low privileges to send a packet that appears to come from a user with higher privileges.

In NetWare and many other local-area network operating systems, a basic command to the file server can be transmitted in a single Ethernet or token-ring packet. An example of such a single-packet command is "Give the user GUEST the same privileges as the SUPERVISOR." NetWare does not expect a verification for such a request, even when the request involves critical, security-oriented tasks such as granting file access to users.

At the lower protocol layers — the NetWare Core Protocol, to be specific — the NetWare operating system does not check



21
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New 3M Floptical® diskettes may look like ordinary 3.5-inch diskettes, but they offer over 28 times the capacity*—at a low system and media cost.

As the world's largest manufacturer of media, 3M is a leader in producing the new Floptical diskette using a unique combination of magnetic recording and optical servo track technology. Optical tracks are engraved on the barium-ferrite media surface so the drive can read more data more precisely (1,245 tracks per inch vs. 135 on standard floppies). This not only gives you increased capacity but also improved reliability and performance.



UP TO
24
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Co-developed by IBM and 3M, the new 3M ECart™ ½-inch tape cartridge for the new family of 3490E drives delivers the same proven reliability you've come to expect from 3M 3480 cartridges—with up to twelve times the capacity of the original uncompacted 3480 cartridges, a new shell and improved cartridge handling features.

You'll save time, money and storage space because a single ECart tape cartridge can now store more than two gigabytes of data.

Remote users can now phone home

continued from page 13

One LanRover/E model supports AppleTalk Remote Access for System 7 Macintosh computers and PowerBooks. The other uses Shiva's NetModem/E software to support remote NetWare clients.

Shiva said a future version of the LanRover/E will include multiprotocol support in a single unit for AppleTalk Remote Access, Novell, Inc.'s Internetwork Packet Exchange (IPX) and the Transmission Control Protocol/Internet Protocol.

Both new models come equipped with Shiva NetManager software to provide central configuration and management from a personal computer or Macintosh located anywhere on the network. Shiva NetManager also supports software-only upgrades on LanRover/E, eliminating the need to change read-only memory or disconnect LanRover/E from the network.

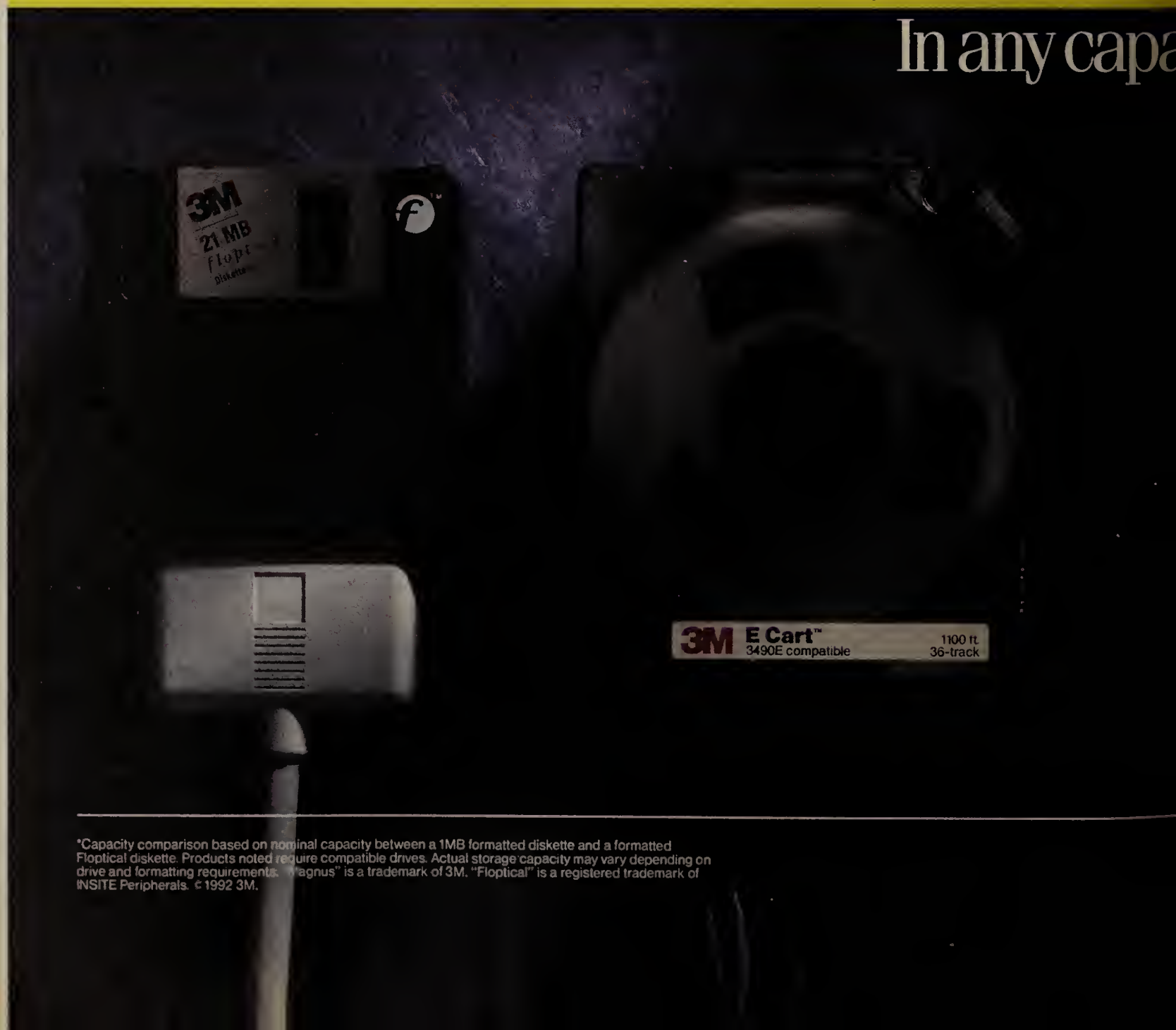
Multiple LanRover/Es can be managed as a single logical unit, and user names, passwords and callback phone numbers can be stored in user list files, then downloaded simultaneously across the network to multiple units.

Therefore, when a user dials into a server that is busy, the call can roll over to the next server.

To restrict unauthorized access to the network, LanRover/E comes equipped with security features such as automatic callback, as well as individual user and administrator passwords. An activity log reports error conditions and keeps track of when remote connections are attempted, established or disconnected.

Both models will be available next month at \$1,999 for the four-port unit and \$2,999 for the eight-port version. 

Plug into proven In any capa



*Capacity comparison based on nominal capacity between a 1MB formatted diskette and a formatted Floptical diskette. Products noted require compatible drives. Actual storage capacity may vary depending on drive and formatting requirements. "Magnus" is a trademark of 3M. "Floptical" is a registered trademark of INSITE Peripherals. © 1992 3M.

to ensure that a packet was really sent by a specific user. Since there is also no encryption of packet information in NetWare, it is fairly easy to send out a counterfeit packet to the file server, which promptly performs the command contained in the fake packet.

In theory, NetWare has been vulnerable to this kind of attack for many years. However, according to a senior programmer at Novell's Provo, Utah, headquarters, it is understandable why hacking programs are surfacing only now.

"In the past year, many books explain-

ing the inner workings of NetWare have appeared," the programmer said. "Programmers can also use software-only protocol analyzers that decode NetWare packets. Overall, it has become much easier for programmers to get into NetWare."

Sessions between NetWare file servers and logged-on users are composed of numbered packet exchanges. Each packet has a number from zero through 255, starting again at zero when 255 is reached.

The first version of the Leiden program bombards the file server with 255 packets, knowing one of them will have the correct

number sequence needed to break into another user's session. With the release of the SECUREFX.NLM patch, Novell effectively countered this brute-force approach by detecting out-of-sequence packets.

However, it is fairly easy to use special software to monitor all NetWare packets on the LAN cable. Even low-cost network analyzers, such as Intel Corp.'s NetSight Express, will give a user that is connected to the network low-level protocol information that obviates the need to guess the correct packet number. The intruder program can send a fake packet with

the correct sequence number, fooling the file server, despite the Novell security fix.

According to Jan Newman, a vice-president at Novell, his company is currently working on a more structural solution for eliminating the loopholes in NetWare security.

"The Leiden program and its derivatives have forced us to reconsider security in NetWare," Newman said. "The measures we're working on now will block not only the Dutch approach, but also many other possible attacks."

Novell intends to release its security enhancements in two stages. The Phase I security enhancements will encrypt network protocol information, making it much harder, if not impossible, for would-be hackers to intercept and interpret packets on the wire.

Specifically, one can expect that Novell will at least encrypt the packet sequence numbers and the packet headers with workstation source and destination addresses. Novell is aiming to release these Phase I add-on products for NetWare within several weeks.

"The measures we're working on now will block not only the Dutch approach, but also many other possible attacks," Novell's Jan Newman said.



"I'm glad Novell will include protocol encryption in its Phase I solution," said a European information planner responsible for the security of a 7,000-node international PC network based mostly on NetWare. "However, judging from the information Novell has given us so far, the security fix will probably involve updating the network software on the servers and the workstations. That's going to be a massive task. We'll probably focus on first securing the sensitive accounts."

Early next year, Novell intends to ship Phase II security products, which will encrypt all data moving across the wire.

Novell engineers have stated they do not yet know what the performance penalty will be due to the Phase I and II security products. Apparently, maintaining the performance levels NetWare customers have become accustomed to will be one of the major engineering tasks.

But LAN users do not have to depend solely on the LAN operating system in order to maintain a secure environment.

At the physical and data link layer, most concentrator and hub vendors offer security features. Products from companies such as Cabletron Systems, Inc., 3Com Corp. and SynOptics Communications, Inc. allow network administrators to control access to the net.

Scrambling the information in Ethernet packets, for instance, makes it impossible for stations connected to the same concen-

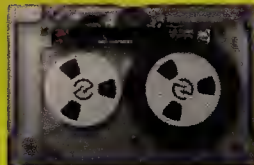
(continued on page 96)



**128
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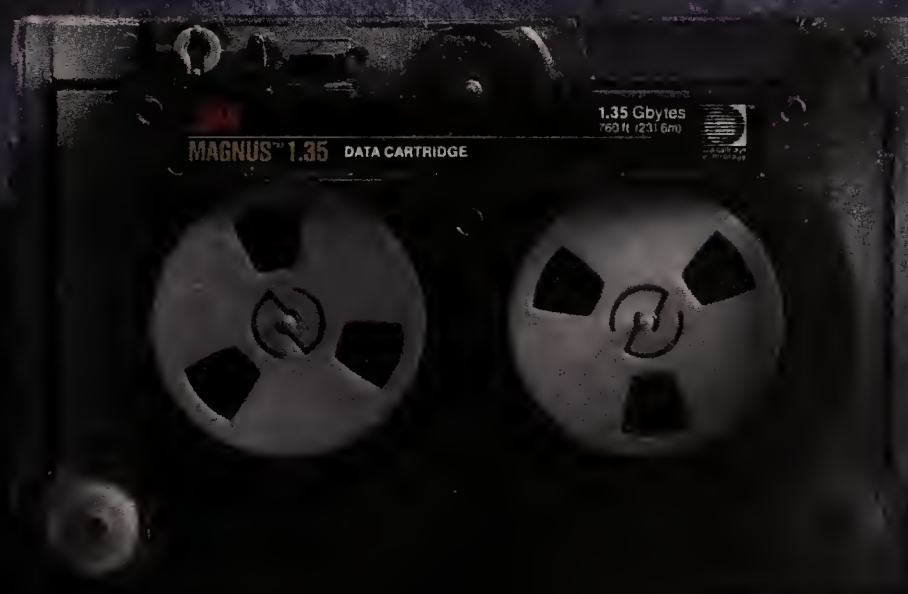
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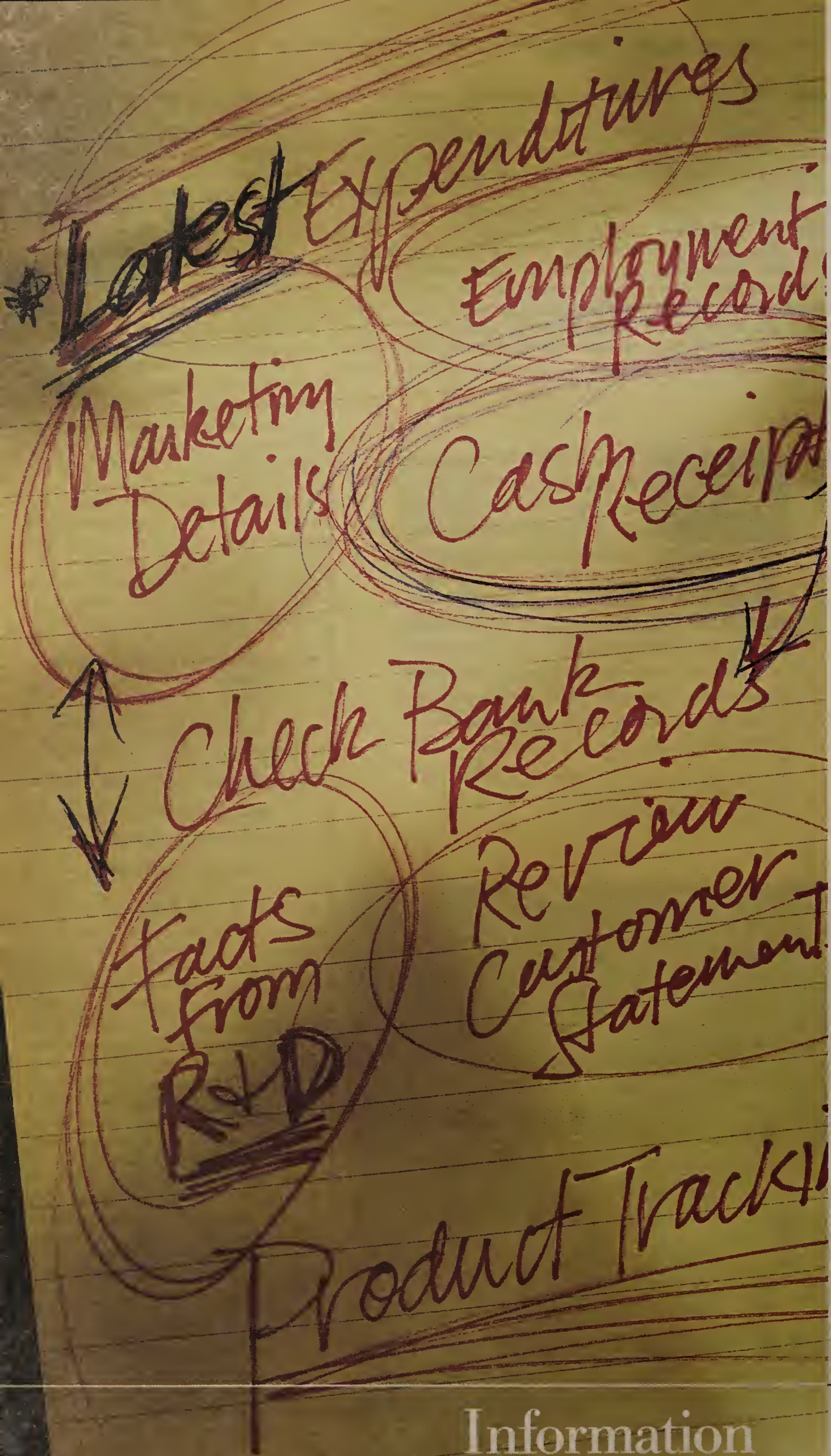
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Issue date October 12, 1992
Card must be received by January 31, 1993

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1. Action requested

- 1 ☐ Request for sales call
2 ☐ Request for proposal
3 ☐ Request for information

2. Purchase timeframe

- 4 ☐ Within 60 days 6 ☐ Within one year
5 ☐ Within six months

3. Scope of purchase responsibility

- 7 ☐ Enterprise wide 8 ☐ Departmental

4. Purchase influence/number of sites

- 9 ☐ one site 11 ☐ 10-20 sites
10 ☐ 2-9 sites 12 ☐ 21+ sites

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Title

Company

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City

State

Zip

Phone

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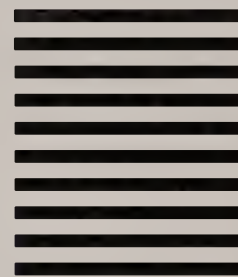
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INTERNETWORKS

LAN-TO-LAN AND LAN-TO-WAN EQUIPMENT AND STRATEGIES

Worth Noting

“Unlike man, all data is not created equal. Some types of data are inherently more important — and timely — than other types.”

Meir Yaniv
Senior vice-president
and general manager
Magnalink Communications Corp.
Norwood, Mass.
Commenting on the need for traffic
prioritization schemes on
LAN/WAN internetworking devices.

Magnalink joins ranks of token-ring bridge makers

Remote bridge offers compression, encryption.

By Maureen Molloy
Senior Writer

NORWOOD, Mass. — Magnalink Communications Corp. last week announced a line of remote token-ring bridges equipped with compression and encryption capabilities that increase throughput and improve security on wide-area links.

The Series 3000 single-port and Series 4000 multiport bridges support 4M and 16M bit/sec token-ring local-area networks, as well as a variety of wide-area network interfaces, including frame relay, at speeds up to 10M bit/sec.

Both bridges support data compression to optimize WAN bandwidth. For WAN rates between 4.8K and 128K bit/sec, the bridges provide 4-to-1 data compression so that a 64K bit/sec line, for example, will accommodate about 256K bit/sec maxi-

mum throughput. At T-1 speeds, the bridges provide between 3M and 6M bit/sec of throughput across a single WAN link.

Added protection

The new bridges also have a dial backup restoral feature, eliminating the need for a costly full-time backup leased line. When the main transmission link fails, the unit will dial up a backup link and resume transmission. This secondary link is then automatically disconnected once the main line is restored.

To ensure the privacy and integrity of data transmitted across WAN links, the Series 3000 and 4000 also offer an optional Data Encryption Standard (DES) feature that encrypts packets so only authorized recipients can read them.

Lastly, the bridges are
(continued on page 54)

Wellfleet's multiprotocol router links remote sites

By Maureen Molloy
Senior Writer

BEDFORD, Mass. — Wellfleet Communications, Inc. last week unveiled a low-end multiprotocol bridge/router for linking remote sites to a corporate internet.

The device, called the Access Feeder Node, is equipped with one Ethernet and two synchronous wide-area network interfaces that can also be used to support IBM Synchronous Data Link Control traffic.

The new bridge/router can be configured, for example, to tie a local SDLC device and an Ethernet LAN to a corporate internet via the other synchronous port.

Alternatively, the two synchronous ports can be used to support connections to the backbone through two sites for redundancy. Or they can be used to provide load sharing capabilities, as well as added bandwidth and fault tolerance, from a single remote site to the internet backbone.

The Access Feeder Node is based on a Motorola, Inc. MC68030 microprocessor and is equipped with 4M bytes of ran-

dom-access memory, 1M byte of which performs packet buffering to minimize traffic overflow and network delays.

It supports the same multiple protocols as Wellfleet's existing Feeder, Link and Concentrator Node bridge/routers, including the Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX), Digital Equipment Corp.'s DECnet, Apple Computer, Inc.'s AppleTalk and Xerox Corp.'s Xerox Network Systems.

On the wide-area side, it supports X.25, frame relay, the Point-to-Point Protocol and Switched Multimegabit Data Services up to T-1 speeds.

It supports transparent bridge and source-routing bridge algorithms, as well as the Open Shortest Path First routing protocol.

The device can be managed from any Simple Network Management Protocol net management system at the central site, obviating the need for technical support at the remote site.

The Access Feeder Node costs \$5,995 and is available now. □



“ATM is absolutely going to happen, and it's one of the most important technology shifts since Ethernet and token ring were first announced.”

Ralph Ungermann
President and CEO
Ungermann-Bass, Inc.

UB chief views ATM as the tie that binds

Ungermann sees a new world of internetworking revolving around high-speed switching technology.

Q&A With Asynchronous Transfer Mode (ATM) emerging fast, local-area network hub vendors have been hard at work formulating strategies to accommodate the new technology while protecting the installed base of their customers.

Ralph Ungermann, president and chief executive officer of Ungermann-Bass, Inc., recently offered his views of the internetworking industry and the positioning of ATM in that environment with *Network World* Executive Editor John Dix and Staff Writer Skip MacAskill.

Will ATM obviate the need for the existing LAN technologies?

ATM is absolutely going to happen, and it's one of the most important technology shifts since Ethernet and token ring were first announced. But we're all stuck with what we have. Because applications are tied to the technology, we're going to have to live with SNA, Ethernet, token ring and hosts for a very long time.

ATM won't come in and wipe out a lot of these issues, but it is a great underlying technology on which to build networks in the future.

Are you well positioned to integrate ATM into your installed base?

We think that integrating and migrating to ATM is very important, and you have to have a plan and a solid architecture to do that. ATM is a big step, however,

because it's not like bringing out Ethernet. It's a much more complex technology. ATM is really the foundation for building new services that will make integration easier.

Right now, you have a hodgepodge of different devices in the net, each with its own network management and connectivity problems. It's complex because there is no management tool to go across the board. As we move

ATM is a great underlying technology on which to build networks in the future.

toward a more common technology such as ATM, it will give us the opportunity to have much fewer pieces with consistent management throughout the whole system.

ATM will not solve the integration problem for decades, but it will make it easier as we get more common strategy.

What is UB's ATM strategy?

We think it's important that we have a clear migration path to ATM to allow customers to take what they have now and use it during the transition [to ATM].
(continued on page 54)

Link Notes

Complex, Inc. is expected to unveil at this week's Seventh Annual NetWorld Dallas conference a 10Base-T, fixed-port stackable hub and management module geared to work group and remote office environments. The new TP-3000 Microhub is a six-port device that can be stacked in groups of four to provide as many as 24 Ethernet connections. The IN3000 is an external SNMP-based management module that can sit above or below the hub stack.

The TP3000 will be available in October and costs \$439. The IN3000, available in November, costs \$639. For more information, contact Complex at (714) 630-6521.

Chipcom Corp. last week announced it will port its ON-demand Network Control System (NCS) software package to Digital Equipment Corp.'s net management platforms, which will allow DEC users to manage Chipcom's ONline System Concentrator intelligent hubs using the same workstation that already manages DEC and other gear.

ONDemand NCS will be available in the first quarter of 1993 for both DEC Management Control Center (DEC-

(continue on page 54)

Networking has become part of the mainstream, and users are demanding easier accessibility to the full spectrum of computing platforms. To meet these challenges,

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Bytex unwraps LAN analysis tool to manage hub-based internets

By Maureen Molloy
Senior Writer

WESTBOROUGH, Mass. — Bytex Corp. announced last week a LAN monitoring and analysis tool to help users manage their hub-based internets from a central management console.

Bytex's ProSentry is software based on

the Simple Network Management Protocol and the Remote Network Monitoring (RMON) Management Information Base (MIB) that provides a way for the vendor's Series 7700 Intelligent Switching Hub to cull statistical information and analyze protocols on the various local-area networks supported by the hub.

It also works with any other RMON device, such as Hewlett-Packard Co.'s Lan-Probe. RMON is an SNMP MIB that specifies a standard way for management systems to capture data packets traveling across the net. Unlike other SNMP-based devices, RMON devices simply capture packets.

Previously, net managers had to manually link a portable protocol analyzer to each network segment. With ProSentry, net managers can now gather real-time statistics and perform protocol analysis on a distributed net via a centralized management station.

ProSentry consists of an RMON agent and client. The client runs on the Series 7700 Unix-based management workstation, and the agent runs on the station's token-ring or Ethernet interface card. Alternatively, agents can be distributed to remote Series 7700 hubs to accumulate error statistics and data packet information, which can then be sent back to the management workstation. The client implements the user interface function for managing, retrieving and displaying the agent information.

In addition to supporting SNMP's RMON MIB, ProSentry agents perform protocol decoding for LAN protocols, including the Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX), Apple Computer, Inc.'s AppleTalk, Digital Equipment Corp.'s DECnet, Xerox Corp.'s Xerox Network Systems, Banyan Systems, Inc.'s VINES and IBM's Systems Network Architecture.

The Ethernet version of ProSentry supports all nine of the statistical and network information groups defined by the Ethernet RMON MIB, including statistics, history, alarms, hosts, traffic matrix, filters, HostTopN, packet capture and events. The token-ring version adds support for the token-ring group and complies with the latest release of the Token RMON standard, which is still evolving.

Bytex said it will update customers within 60 days of the acceptance of the final standard.

ProSentry client software costs \$6,995, while the agent software for the management station costs \$1,795 for both the token-ring and Ethernet environments. Stand-alone token-ring and Ethernet agents cost \$4,995 each. All three are available now.

PC-based management

Bytex also introduced a personal computer-based version of its Series 7700 Network Management System (NMS) that runs under Windows 3.1.

Aimed at smaller internets of up to several hundred nodes, the Series 7700 NMS for Windows provides all the benefits of the company's Unix-based NMS platform but more cost-effectively, according to Bill Starnier, vice-president of product marketing at Bytex.

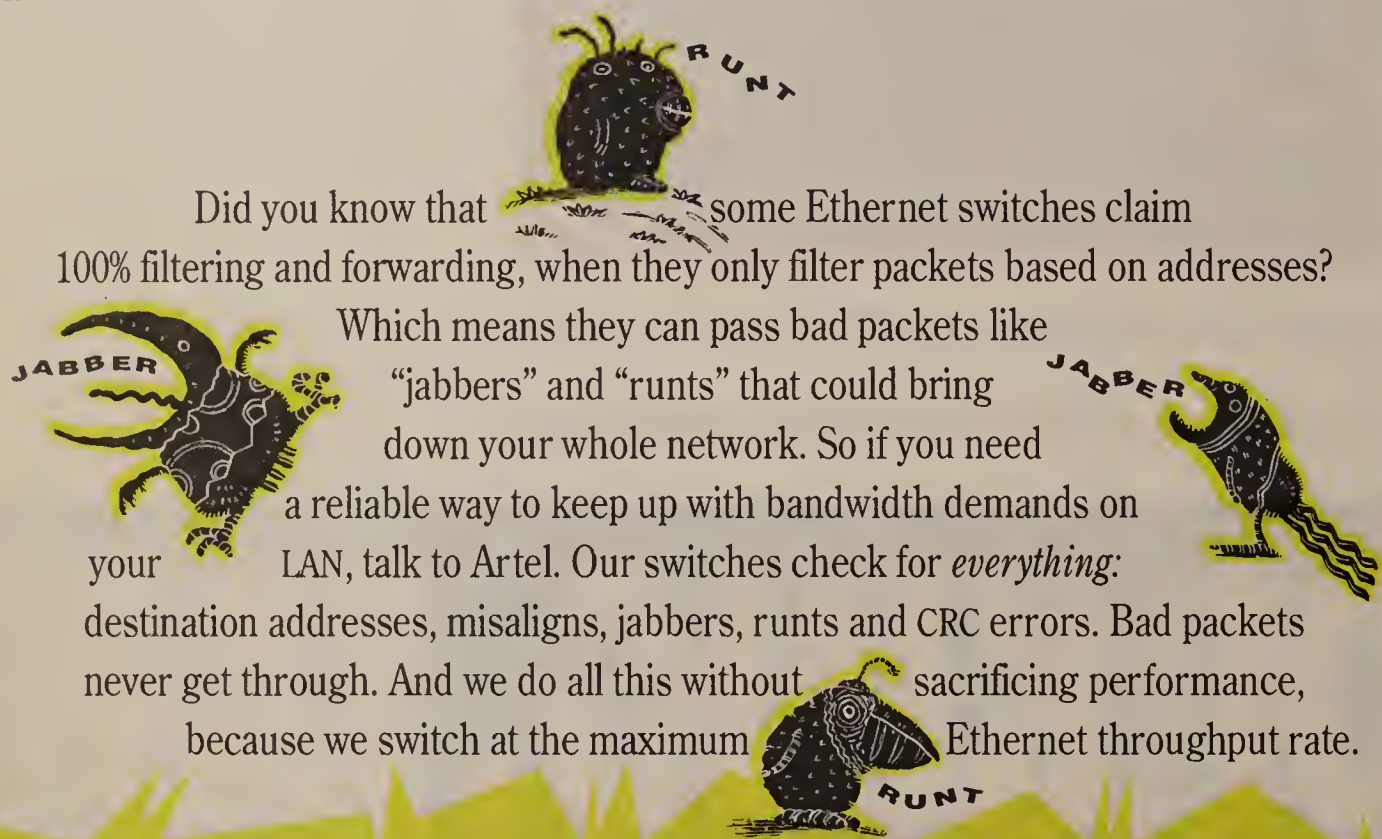
In addition to a Windows-based graphical user interface, Series 7700 NMS for Windows features a set of applications for defining, implementing and managing LAN configurations.

For token-ring LANs, the Series 7700 NMS for Windows lets net managers build configurations by assigning individual ports to one of 32 token rings supported by the Series 7700 hub. For Ethernet LANs, net managers can assign Series 7700 10Base-T Ethernet ports to one of three Ethernet backplane segments, or as many as 12 independent Ethernet segments.

In addition, the Series 7700 NMS for Windows dynamically maintains a log of hub and LAN events, and reports the operational status of the hub.

Bytex said it will offer its ProSentry client software for this DOS-based platform by the end of the year.

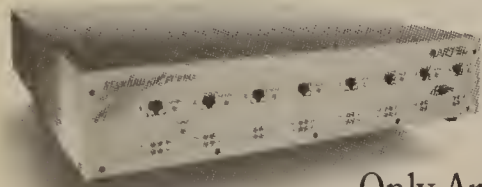
The Series 7700 NMS for Windows costs \$2,195 and will be available next month. 



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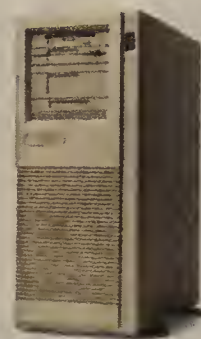
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GLOBAL SERVICES

DOMESTIC AND INTERNATIONAL VOICE/DATA SERVICES, ACCESS EQUIPMENT AND REGULATORY ISSUES

Worth Noting

Sprint Corp. last week said it has extended its International Clearline private-line service — which runs up to 2.048M bit/sec — to Italy, Spain, Brazil and Chile. The carrier will offer the service to several more countries by year end.

Economics of tariff service providers

Charges derived from evaluation period

Company	Actual subscription period (in 1991)	Number of pages billed	Average price per page	Total charges
ITS*	July 5 - Oct. 5	1,315	\$0.14	\$225.00
CCMI	July 8 - Oct. 4	1,431	\$0.29	\$411.37
Tele-Tech	July 1 - Sept. 30	1,494	\$0.25	\$373.50
TIS**	July 8 - Sept. 30	1,035	\$0.22	\$226.05
Valucom	July 8 - Sept. 30	1,433	\$0.13	\$193.00
Downtown Copy Center***	July 1 - Oct. 1	1,313	\$0.14	\$185.21

* Since ITS does not bill for the number of pages shipped, TeleChoice calculated the price per page on a prorated scale based on the number of pages received.

** The first month's pages and fees, which were waived, are not included in the total. The number of pages and total charges are for service during Aug. 1, 1991, through Sept. 30, 1991.

***Downtown Copy Center charges 1 cent per page extra for 3-hole punched tariff information, which would increase its per-page price to 15 cents.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

Tariff-tracking companies help keep tabs on services

Rapid service rollouts, changes confuse users.

By Daniel Briere
Contributing Editor

The amount of data represented in carriers' tariff filings is often measured more in inches than pages.

The sheer volume of tariff data is enough to tempt any user to turn to any of several tariff service providers, a small collection of companies that ease the burden of collecting and sorting tariff filings.

"We've been leaning heavily on our providers to let us know when pages and transmittals are missing so that our time invested is kept to a minimum," said Anne Custodio, a product manager for The Aries Group/MPSG in Rockville, Md.

However, a survey conducted for *Network World* by TeleChoice, Inc. revealed that none of the six companies that participated in a three-month evaluation of their services were fully efficient.

The service evaluation, which TeleChoice conducted between July 1, 1991, and Sept. 30, 1991, focused on The Center for Communications Management Information (CCMI) of Rockville, Downtown Copy Center of Washington, D.C., International Transcription Services, Inc. (ITS) of Washington, D.C., Tele-Tech Services of McAfee, N.J., Telecommunications Information Services, Inc. (TIS) of Concordville, Pa., and Valucom, Inc. of Vi-

enna, Va.

Following the initial service evaluation, TeleChoice conducted follow-up interviews over several months to gauge changes in service levels.

Performance and accuracy

Regardless of why a network manager decides to use a tariff service provider, reliability is crucial. It is difficult to discern whether you are missing pages, unless you check directly with the Federal Communications Commission or the carrier, which can be time-consuming.

Of the six providers evaluated, not one was 100% efficient in sending all relevant updates and other supplemental information. TIS had the best record, with only 1% of its updates failing to reach the subscriber. Valucom, CCMI and Tele-Tech were close behind. Downtown Copy Center had the worst record; 18% of its updates were never received.

Receiving unsolicited tariffs may be a cause of concern for some end users because it requires time to weed out the unnecessary pages. Two suppliers — ITS and Downtown Copy Center — frequently mailed updates for unsolicited tariffs.

ITS mailed 30 unsolicited tariffs, and Downtown Copy Center mailed 14 during the three-month evaluation period. In the

(continued on page 26)

New option to ease private-line mgmt.

Cable & Wireless offers customers a single point of contact for medium-speed private-line services.

By Bob Wallace
Senior Editor

VIENNA, Va. — Cable & Wireless Communications, Inc. is expected this month to announce an offering that off-loads maintenance and management chores from users and makes it easier to obtain private-line service.

With the Managed Private Line Service (MPLS), an option of the carrier's domestic private-line service, Cable & Wireless will serve as a single point of contact for ordering and providing local access and long-haul links, supplying customer premises equipment and maintaining end-to-end circuits.

MPLS will be generally available in the next two weeks for leased lines running at up to 56K bit/sec and will be extended to higher speed lines in early 1993.

The service is targeted at companies with private-line networks

of four to 50 circuits, said Gabriel Battista, executive vice-president and chief operating officer at Cable & Wireless.

"What we're doing is agreeing to handle as many aspects of private-line networking as customers want," Battista said. "And we've had several sizable Cable & Wireless customers ask us for this option."

Battista said Cable & Wireless will act as a single point of contact for providing local loops, backbone circuits, diagnostic tools, trouble response systems and data service units/channel service units (DSU/CSU) from General DataComm Industries, Inc. and Racal-Datacom, Inc.

With MPLS, the customer's private-line network is connected via a dedicated "monitor link" to the Cable & Wireless Network Monitoring Center here from

(continued on page 28)

Report says users suffered 91 big outages since April

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Local and long-distance carriers have experienced 91 major outages since April that each affected at least 30,000 lines or sensitive facilities, according to a report released by an FCC advisory group.

The report was released earlier this month by the Network Reliability Council (NRC), a group of carriers, equipment manufacturers and users chartered by the Federal Communications Commission to monitor public network reliability. The FCC formed the group last fall after a series of major outages during the last two years crippled the networks of AT&T and two regional Bell holding companies, knocking out service to millions of customers.

The NRC report indicates the number of major outages has remained relatively constant during its five-month study period this year from April to September. However, some types of out-

ages appear to be increasing in frequency compared to outages tracked by the FCC last year.

According to data submitted by carriers to the FCC, during the last nine months of 1991, central office switch failures were responsible for six major outages affecting 50,000 lines or more.

But during the last 5½ months of this year, there have been nine major outages caused by central office switch failures that either affected 50,000 lines or cut service to a site deemed critical by the FCC. Critical sites include military installations, nuclear power plants or major airports.

In addition to the nine central office switch failures reported by the NRC, 52 other major outages affecting at least 50,000 lines occurred. Tandem switch failures caused 11 of those outages, fiber cuts caused 22, Signaling System 7 (SS7) failures caused four, network overloads were responsible for 10, and five other outages

(continued on page 26)

Regulatory Update

Southwestern Bell Telephone Co. last week detailed plans to build a first-of-its-kind T-3 fiber network across Missouri.

The network is designed to support existing and new bandwidth-hungry applications.

The \$82 million network will link virtually every school and hospital in the state, and is being built primarily to support distance learning and medical applications.

The fiber network effort is part of a three-year \$153 million continuation of a network modernization/incentive regulation plan. Southwestern Bell submitted the fiber net project to the **Missouri Public Service Commission** for approval.

Under incentive-based regulation, local telephone companies are encouraged by state regulators to invest in their network. Those that do are allowed higher earnings. The resulting revenues are shared with customers in the form of lower rates.

Toward that end, the plan calls for Southwestern Bell to lower long-distance rates for calls within the same area code, freeze basic local rates for three years, share profits with customers and lower access charges. ■

Firms help keep tabs on services

continued from page 25

case of ITS, which charges a flat monthly fee for its update service, there is no cost for unsolicited pages. However, Downtown Copy Center charges by the page and does not include a packing sheet to confirm that correct pages were sent. Also, since Downtown Copy Center charges subscribers for mailing costs, the unsolicited pages add to mailing weight and other related charges.

Often, you get only what you asked for, and if you are not clear in your directions, you might miss out on some key data. For instance, some customers need transmittal support material, which includes, for example, a description and justification of a carrier's actions in conformance with FCC rules and regulations. ITS was the only vendor that mailed all of the transmittal support material available unrequested and at no extra cost.

Other vendors said they could mail it as an added service.

Timeliness of updates

Getting new transmittals quickly might be of concern if users wish to react as soon as possible to rate changes.

In order to evaluate the timeliness of a tariff provider's service, we measured the difference in days between the date the transmittal was filed and the date the information was shipped by each provider. Although carriers file tariffs continuously, several vendors ship their mailings in batches every 10 to 15 days.

ITS had the fastest standard delivery record: an average of 4.9

days. Downtown Copy Center took the longest — 14.1 days from filing to mailing.

Each supplier offers special delivery options at an extra cost for quicker delivery. Again, state how soon you want the tariffs; many providers would have automatically sent us batched mailings unless requested otherwise.

Since the time of the original evaluation, several vendors have taken steps to improve their over-

tion providers: readability, packing-sheet information content and invoice content.

Readability was assessed by examining the quality of the tariff transmittal photocopy. ITS was the best provider in this category, with Downtown Copy Center, CCMI and Tele-Tech close behind. TIS was the worst. However, all were readable to the eye, and only customers with scanners might have problems with

Often, you get only what you asked for, and if you are not clear, you might miss out on key data.



all speed in getting tariff data to customers. TIS opened a Washington, D.C. office, which enables it to get filings two days earlier than before. It also launched an InfoFax facsimile-on-demand service that makes tariff filings available automatically to any fax machine within 48 hours of tariff filings at the FCC.

Valucom also has a new Electronic Tariff Information Service, an electronic library that gives users access to images of actual tariff pages via their computer monitor. The service lets users electronically search for key words or services.

Quality of service

Quality is an important part of any service evaluation, especially when lack of quality can make more work in the long run. Three aspects of service quality were evaluated for the tariff informa-

the poor-quality reproductions.

The tariff update services vary widely in the type and extent of information they send to their customers, in addition to their update mailings. There are two general forms of informational mailings provided regularly with the tariff transmittals: a packing sheet for each mailing and a tariff cover sheet for each transmittal.

Valucom includes a general packing sheet detailing the contents of the entire mailing as well as individual tariff cover sheets for each update. TIS does not supply a general packing sheet, but it does include tariff cover sheets with helpful summary information. Unfortunately, TIS often bunches the tariff transmittals under one cover sheet, making it more difficult to find a specific transmittal filing (although it will separate the tariffs by transmittal number at a higher cost).

Tele-Tech provides tariff cover sheets only when a problem, such as a missing page, occurs. Downtown Copy Center and ITS provide no special packing or tariff cover sheets. ITS provides customers with copies of the official FCC Tariff Log to compare to the filings. However, we found this to be unreliable data when validating the actual filings.

Tele-Tech offers one interesting service with its mailings. Where applicable, it staples an advisory note to the transmittal stating that the information on the attached pages is still pending and that the client should wait before filing the pages in case there are any changes made by the carrier or the FCC. Also, in instances where there are no updates in a given week, Tele-Tech sends out postcards to alert subscribers that nothing got lost in the mail.

Depending on how you use and file tariff updates, each data element on the packing or tariff cover sheet can be important. For example, if you are tracking changes, including the updated pages' effective date — which both Valucom and CCMI provide — may be extremely important.

The FCC issue date, considered to be vital information to some end users, is included on Valucom's tariff cover sheet. Although Valucom's packing and tariff cover sheets prove to be the most extensive of the six vendors surveyed, they lack some basic information such as the relevant FCC tariff number and carrier for a particular transmittal, which is provided by CCMI and TIS.

Recently, CCMI updated its packing list format so it is among the most comprehensive of the providers, offering itemized list-

ings of all transmittals, including an internal CCMI code for tracking specific tariffs if a problem arises. With the exception of ITS, which sent only one invoice at its flat monthly rate for the entire three-month evaluation period, each of the other suppliers issued a monthly invoice.

Overall, invoices were difficult to understand and did not lend themselves well to easy reconciliation of pages received and pages billed; none of the pages billed matched the number of pages shipped, for instance.

What does it cost?

Pricing elements for each provider vary. Some have a monthly subscription or handling fee, some charge a price per update page, and others have both. In general, packing sheets or tariff cover notes are provided at no additional charge per page.

ITS charges a fixed fee per month or per year, based on the tariffs a subscriber requests. An additional fee for each update page is charged only after a certain number of pages have been sent. This is by far the easiest approach for both the vendor and customer, and it leaves little doubt about the billed charges on a per-page basis. It also makes it easier to budget.

The chart on page 25 indicates the total amount billed for each of the vendors' services relative to the amount of pages they reported to have shipped.

The total prices reflect many different charges. Downtown Copy Center, for instance, charges clients for postage and handling fees, while CCMI and ITS include these fees in their *(continued on page 28)*

Users suffered 91 big outages

continued from page 25

were attributed to miscellaneous problems.

Another 30 outages affecting between 30,000 and 50,000 lines occurred during the last 5½ months. Half of those outages were caused by central office switch failures, one was caused by a tandem switch failure, four by fiber cuts, six by SS7 failures and four were attributed to miscellaneous failures.

If the number of outages continues at the same rate for the rest of the year, users can expect about 219 outages affecting 30,000 or more lines or critical facilities, according to the NRC report.

Currently, the FCC requires a carrier to report outages only if they affect at least 50,000 lines for more than 30 minutes. Users, especially those in the Tele-Communications Association, Inc.,

have pressed the FCC to require reports on all outages affecting 30,000 or more lines.

The FCC was unwilling to lower the reporting threshold, but as-

expanded. When he released the outage report this month, Barletta said he had not decided whether to recommend the threshold be lowered.

network as highly reliable.

John Clendenin, chairman and chief executive officer of BellSouth Corp., said the network in his region continued to operate

two isolated offices in the Florida Keys went down for about two days.

One of the biggest problems was the lack of power, so in advance of the hurricane, BellSouth hauled in 490 portable generators for Florida and 150 for Louisiana.

Clendenin said the performance of the network during the hurricane proves that the carriers are engineering bulletproof networks.

"People were still talking on their phones literally as the walls and roofs were being torn off their houses," he said.

Paul Miner, vice-president of customer and network operations for GTE Telephone Co., reported a similar level of reliability during Hurricane Iniki, which slammed into the Hawaiian island of Kauai this year. He said all central offices survived and though some smaller facilities went down, service was supplemented by cellular facilities. **■**

Comparison of major network outages

Number of lines	Overload	Local Switch	Tandem	Fiber cut	Signaling System 7	Miscellaneous	Total
30,000-50,000	0	15	1	4	6	4	30
50,000-plus	10	9	11	22	4	5	61

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: NETWORK RELIABILITY COUNCIL

signed the issue to the NRC for study. For the purposes of this study, carriers have been supplying the NRC with data on outages of 30,000 lines or more.

At the end of the year, George Barletta, chairman of the NRC's Threshold Reporting Group and vice-president of operations services at Nynex Corp., will recommend to the FCC whether the reporting requirements should be

In its report, the NRC said if the FCC sticks to its 50,000 line cutoff for outage reports, the number of network crashes reported to the agency would be about half as high as if the cutoff were expanded to 30,000 lines.

Despite the number of significant outages reported during the last 5½ months, several NRC carrier members defended the public

in the face of enormous destruction caused by Hurricane Andrew in Florida and Louisiana. He said 83 central offices were located in the disaster area in Florida and 144 were in the disaster area in Louisiana.

Despite the widespread destruction, "there was not a single [central] office failure," Clendenin said, although some smaller facilities were knocked out and



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New option to ease private-line mgmt.

continued from page 25

which technicians can monitor customer nets, Battista said.

If a problem is detected with a private line or attached equipment provided by Cable & Wireless, the carrier assigns personnel to troubleshoot the problem.

Concurrent with the repair effort, Cable & Wireless notifies customers of problems and keeps them up-to-date on corrective measures employed, Battista said.

In addition, Cable & Wireless generates and distributes to MPLS customers a series of quarterly management reports summarizing outages and showing network performance statistics.

Cable & Wireless technicians will even go so far as to work with the local telephone company and the building owner to ensure that the customer's inside wiring is properly installed.

The carrier has not yet finalized pricing for MPLS, Battista said. A beta test of the service with an unidentified user is expected to conclude shortly. **Z**

Tariff-tracking firms keep tabs on services

continued from page 26

price-per-page costs.

Downtown Copy Center had the lowest overall cost for the study period; CCMI was the most expensive. The total cost figures in the chart represent only the first step in determining what the actual cost per page is for each vendor, a figure that depends on the number of pages each vendor ships and for which pages each vendor bills. Also, some providers, such as CCMI, offer ag-

gressive discount plans based on the number of tariffs a customer receives.

During the evaluation, Downtown Copy Center's cost per page was actually higher than Valucom's because Valucom shipped more pages.

Users should press tariff providers for special deals because many promotional prices are not noted on pricing sheets. For example, Tele-Tech will discount services for an annual commitment, and CCMI will discount services billed to credit cards. Some of the higher priced providers offer a range of value-added services bundled with the tariff offerings that may justify the higher cost if those services are wanted by the customer.

According to ITS, it does not compete with the other five providers in this study because it does not provide these extra services. "ITS concentrates on getting what was filed to the customer as fast as possible and at the most reasonable price," said Martin Clark, president of ITS.

Some of these extra services are valuable resources for users that do need them, however. CCMI, for instance, offers a monthly newsletter, the "CCMI News Digest," that summarizes key industry events. CCMI also has seven full-time tariff analysts that answer questions for subscribers.

The bottom line

Each vendor has room for improvement; no single vendor outperforms all the others. For the money, Valucom seems to offer the best value and information content on its invoices and packing sheets. It does not, however, have a perfect record on complete shipments — it failed to send two updates during evaluation.

If simplified billing is a primary concern, ITS may be considered the best service. Also, it had the fastest standard delivery record. But ITS subscribers should be prepared to deal with numerous unsolicited pages and information, inaccuracy in sending required transmittal updates, and an absence of packing sheets.

Although it is the highest priced supplier, CCMI does not offer the highest quality of information content, packing sheets and invoices. It does provide certain courtesies, such as advisory notes to clients when they discover update pages missing, at no additional charge. However, the firm's accuracy rating is not as high as some of the other providers'. But recent improvements to CCMI's quality control system have likely solved these problems.

Make sure you know what you are buying and at what price. Ask tough questions to assess the vendors' services and support as they relate to your specific requirements. Ask vendors for an explanation of invoicing procedures and bills, and ask how errors will be identified and handled.

"Customers should stress the specific service and parameters [they] want, examine the timeliness of the information and make sure that the provider can deliver it as promised," said ITS' Clark. "It may be complicated, but ask for an apples-to-apples comparison." **Z**

Briere is president of TeleChoice, Inc., a Montclair, N.J., consultancy specializing in strategic planning and analysis of intelligent networks, services and applications.

Focus On Token Ring

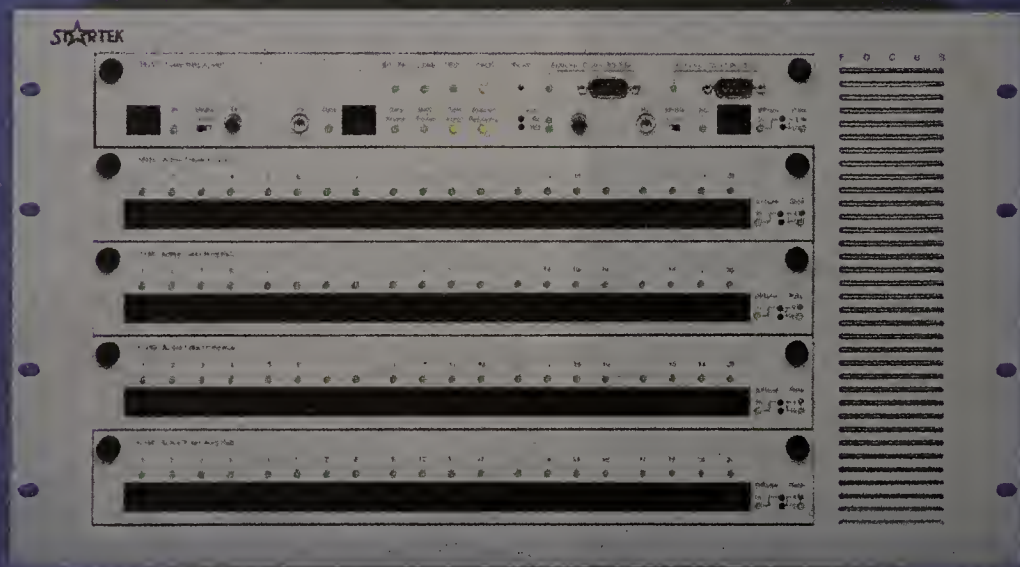
RISC-based network management agent supports SNMP, in-band and out-of-band communications, and RMON-compatible network analyzer functions.



2 Slot Chassis

Backplane support for Token Ring, Ethernet, and FDDI is standard for all chassis models.

Distributed Recovery Intelligence within each lobe module isolates faulty nodes automatically, even if the agent module is absent or down.



5 Slot Chassis

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McData covers ESCON from both ends

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"With dual-host channel support, users can transition from the bus-and-tag world to the ESCON environment as their applications become available on the ES/9000," said Loren Card, product manager for the 7100.

Saving space

Support for multiple mainframe links reduces hardware requirements and saves floor space, as does the ability to rack-

mount the 7100, Card said.

For example, Amdahl Corp.'s Certification Group — which does customer testing in Sunnyvale, Calif., for Amdahl users — saved approximately \$23,000 a year in floor space rental and an additional \$17,000 in maintenance costs by using the 7100, according to Phil Jeffrey, a staff programmer for Amdahl.

The company has 13 McData 7100 controllers it plans to upgrade to support ES-

CON and has ordered an additional 14 ESCON-based 7100s.

"We also saved a lot of money by adding the ESCON support to our existing 7100s and not going out and buying new 3174s with ESCON support," Jeffrey said. Users that want the benefits of fiber technology but don't want to shell out for a full-blown ESCON implementation can look to McData's new LinkMaster 5044 channel extender.

Although it does not support ESCON, the 5044 is a fiber optic-based channel extender that lets users employ a 12M byte/

sec fiber link between the mainframe and attached peripheral devices. Attaching a 5044 at both ends of the link increases the allowable distances between mainframes and devices such as controllers and direct-access storage devices up to almost two miles.

"It's an inexpensive alternative to ESCON for small to midsize users that aren't quite ready to move to ESCON," said Walter Hinton, product manager for McData's channel extension line.

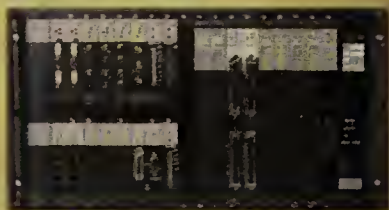
The 5044 is a replacement for IBM's 3044, which Big Blue stopped producing in September, Hinton said.

Release 3.0 of the LinkMaster 7100 is available now.

Pricing for new 7100s ranges from \$14,635 for models supporting 16 devices to \$30,135 for 128-device models.

The 5044 is sold in pairs and is available now for \$18,000 per pair. ■

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Wall Data broadens support for gateway

continued from page 11

SNA printing services as if they were native SNA terminals. Until now, most 3270 users on TCP/IP networks had to forgo native SNA printing services, Wall Data said, because 3270s actually emulate TCP/IP Telnet terminals to communicate with an IBM host running TCP/IP software. That software does not support SNA print services, the company said.

Rumba Gateway System does not require TCP/IP software on the host, Wall Data said, thereby avoiding Telnet emulation while retaining native SNA attributes in terminal-to-host connectivity.

The Rumba Gateway System connects to the mainframe via two Synchronous Data Link Control links at 19.2K or 64K bit/sec, or three Token-Ring links at 4M or 16M bit/sec. One Rumba Gateway can accommodate up to 254 host sessions per host connection. Multiple gateways can be configured to share the session load to improve performance and mainframe accessibility, Wall Data said.

Rumba Tools for APPC, meanwhile, provides an interactive graphical development environment so Windows application developers don't have to be experts in APPC programming, Wall Data said.

Included is a macro scripting utility, called VerbTalk, that uses a point-and-click visual programming interface to make it easier to establish APPC links between applications. VerbTalk macro scripts can be called directly from a Windows program.

Rumba Tools for APPC can be used by itself, with Rumba software for IBM mainframes or with Rumba for Application System/400s. Type 2.0 or 2.1 physical units can run 3270, 5250 and APPC sessions simultaneously.

Rumba Gateway System Version 2.0 is priced at \$1,495. Rumba Gateway System client software packages are priced at \$395 for one user, \$3,250 for 10 users, \$6,125 for 25 users and \$13,000 for 64 users. Rumba Gateway System Version 2.0 is available immediately. Rumba Tools for APPC is priced at \$495. The Rumba APPC engine for IBM mainframes or AS/400s is priced at \$100 per user. Rumba Tools for APPC and Rumba APPC engine will be available in the fourth quarter. ■



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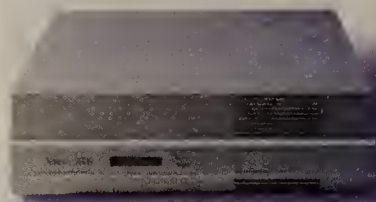
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(What is it?)



It's an SNA gateway. (That's nothing new.) **It's also a local router.** (Excuse me?) **It's an SNA gateway and a local router** (You mean in one product?) **in one product. So it provides you with two solutions in one:** (Let me guess; the functionality of a gateway along with the performance of a router.) **the functionality of a gateway combined with the high-performance of our router's SPARC processor.** (I was close.) **Since this new product** (I think it should be called a gateway-router.) **performs two functions at once, it offers unprecedented levels of administrative convenience and manageability.** (But does it access multiple LANs?) **It also accesses multiple LANs, including Token-Ring, Ethernet, and LocalTalk,** (Ask a stupid question...) **and supports mixed PC environments such as Windows, Mac, and DOS.** (Holy Toledo.) **Naturally, our Netway gateway-router** (Hey, that's *my* name for it.) **can route Novell IPX and AppleTalk protocols,** (And?) **and comes complete with powerful 3270 services like terminal and printer emulation.** (I wonder who came up with this thing.) **As you might have guessed by now, the company behind this revolutionary product is Avatar,** (I should have known.) **leaders in SNA connectivity for over a decade.** (Must be about time for the obligatory 800 number.) **For more information, and our free "Gateway-Router Guide to Network Manageability," send in the coupon or call 1-800-AVA-3270.** (A free gateway-router guide? You must have read my mind.)

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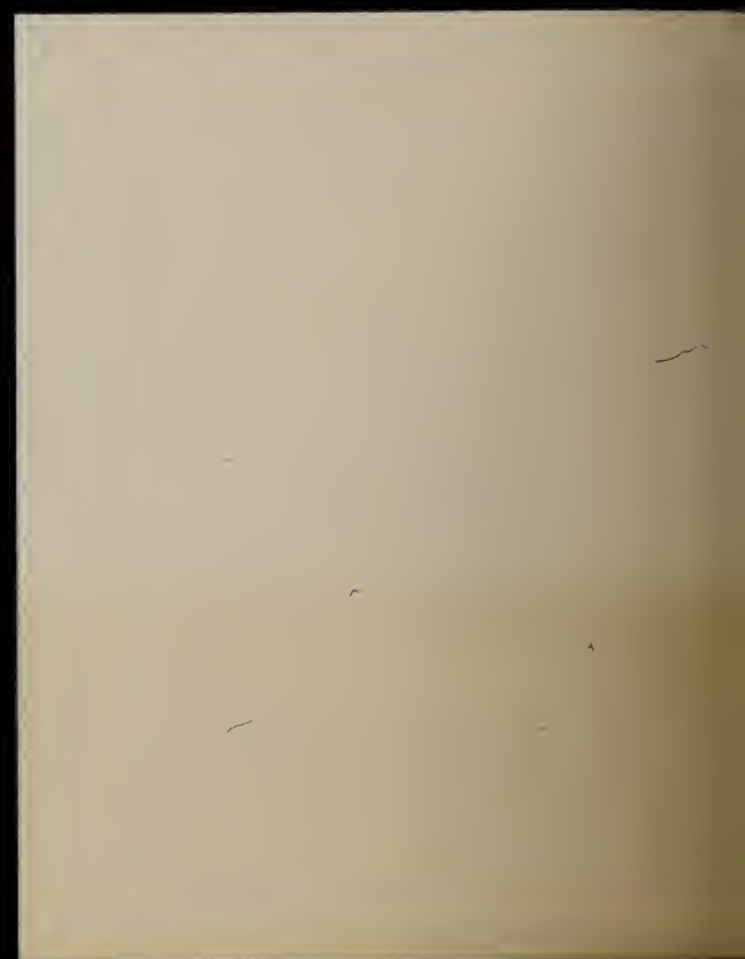
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ENTERPRISE APPLICATIONS

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Worth Noting

“Application program interfaces are more strategic than products.”

Aaron Zornes
Vice-president and director
Application development strategies
META Group
Westport, Conn.

Store & Forward

SunSoft, Inc. said recently it will incorporate a subset of Object Design, Inc.'s ObjectStore object database into the Solaris 2.0 operating system.

The move will enable SunSoft to create an object-oriented environment that conforms to the Object Management Group's Object Request Broker standard for handling communications among distributed objects on user networks.

SunSoft said it will provide an open interface to the object technology so that third-party software developers can write distributed object-oriented applications under Solaris 2.0.

Object Design will provide SunSoft with the object technology early next year.

Dunn & Bradstreet Software has signed a \$10 million contract with the State of Texas for D&B Software's payroll and personnel software for IBM DB2 relational databases. The contract is the largest ever for D&B Software.

Mustang Software, Inc. recently announced Qmodem-Pro communications software, which manages the receipt and delivery of E-mail from a variety of third-party E-mail services, such as MCI Communications Corp.'s MCI Mail and CompuServe, Inc.'s CompuServe. Available now, it costs \$99. ☐



“The problems users face today are much more basic than doing two-phase commit across an ocean. People are focusing on getting better performance and interoperability out of existing applications and architectures.”

John Luongo
President
Trifox, Inc.

Trifox takes the ‘middle’ road to link database apps

Exec discusses concept of database middleware.

Q&A With the industry push toward open systems, users are increasingly looking for ways to deploy database applications across heterogeneous platforms on a network. Although progress is being made, there are still very few tools that can provide seamless access to data in both client/server and host-based architectures.

Over the past six months, a new class of software, called middleware, has emerged that attempts to shield users from the complexity of the underlying net protocols by providing a layer of software between the application and the operating system.

Although this concept of middleware has been applied mostly to communications system software, there is a new movement to label database interface software that provides access to various back-end database servers as database middleware.

One company that is involved in this movement is Trifox, Inc., a San Mateo, Calif., developer of tools and database middleware that helps bridge the gap between host-based applications, relational databases and, in the future, object-oriented technologies.

Trifox has introduced a toolset, called Vortex, that provides a way to link database applications created in different vendors' development environments, including its own TRIMtools, with a variety of back-end database servers.

John Luongo, president of Trifox, recently talked with *Network World* West Coast Bureau Chief Timothy O'Brien about this concept of database middleware

and how Trifox is moving to address that market.

Luongo was formerly senior vice-president of Oracle Corp.'s International Division and was responsible for all overseas marketing, sales and strategic business development.

How would you define middleware?

I would define middleware as a layer of software that integrates disparate technologies. Some people use the analogy of a glue that binds certain pieces of software together.

One important point to recognize is that the concept of middleware is not specific to a technology area. For instance, these products can deal with more than network technologies. They can deal with graphical user interfaces, database management systems or other areas.

For each of these technologies, you have a situation where middleware simplifies the process of connecting various software products, regardless of whether or not these products compete with or adhere to standards. As a result, developers or users don't have to deal with all that diversity resulting from multivendor configurations and can instead focus on their own technology or applications.

What we are doing specifically with database middleware products is integrating a variety of front-end application development tools — including C, Cobol, Oracle's SQL*Forms, our own TRIMTools and, in development, a compiler for Informix Software, Inc.'s Fourth Genera-

(continued on page 35)

Beyond gets jump on cc:Mail in Notes race

Firm integrates BeyondMail with Notes to head off Lotus' plans to tie in product with cc:Mail.

By Wayne Eckerson
Senior Editor

CAMBRIDGE, Mass. — Beating cc:Mail to the punch, Beyond, Inc. last week announced that it has integrated its BeyondMail messaging software with Lotus Development Corp.'s Notes work group product.

The new product, BeyondMail for Lotus Notes, provides Notes users with a robust messaging and work flow utility that can replace or supplement Notes' internal messaging system.

The announcement was a preemptive strike launched by Beyond to minimize the impact of Lotus' plans to integrate Notes with cc:Mail, a leading LAN-based electronic mail system that Lotus acquired in a 1991 buyout of cc:Mail, Inc.

“The whole point is that we are [integrating advanced messaging with Notes] substantially sooner than Lotus,” said Chuck

Digate, Beyond's president.

David Marshak, vice-president at the Patricia Seybold Group, said, “Beyond has laid down the gauntlet, saying it can bring more functionality to Notes users than Lotus can.”

Marshak said Beyond has had difficulty selling its software to Notes customers who were waiting for Lotus to integrate cc:Mail and Notes. “Many users thought that since they had Notes, they should also incorporate cc:Mail,” he said.

Cliff Conneighton, marketing director for the communications products group at Lotus here, said his company welcomes the efforts of any software developer that adds value to Notes.

He added that Lotus plans to begin integrating cc:Mail with Notes starting with Notes Version 3.0, which is in final beta test now and was originally scheduled for

(continued on page 36)

Express delivery firm flies high with EDI technology

By Wayne Eckerson
Senior Editor

SEATTLE — In the fiercely competitive package delivery business, Airborne Express has wielded electronic data interchange technology to cut costs and foster customer loyalty.

The overnight courier uses EDI to send out invoices, collect shipping information and receive remittances from hundreds of customers daily. Buoyed by the success of its early EDI efforts, Airborne Express now considers the technology a strategic weapon for succeeding in the 1990s.

To expand its list of EDI trading partners, the company is trying to make it easier and more attractive for customers to utilize EDI. Therefore, it is implementing EDI services that enable customers to consolidate the process of ordering, shipping and paying for Airborne Express delivery services.

For example, Airborne Ex-

press offers a Customer Linkage program that uses EDI to link customers' order entry systems with its computers to automate the process of gathering and transmitting customer shipping information. Instead of filling out an air bill by hand, customers' order entry systems generate a shipping label that tells Airborne Express package handlers, for example, where the package is to be delivered, whom it is from, how much it weighs and how much it costs to send.

At the end of each day, customers transmit all this shipping information directly to Airborne Express via an EDI connection. This information doubles as an Airborne Express invoice, allowing customers to make payments by referencing the package delivery date.

Airborne Express recently introduced QuickLink, software that makes it easier for compa-

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Trifox takes 'middle' road to link apps

continued from page 33

tion Language — with the leading back-end DBMSs.

Our software essentially sits between these front-end applications and the database. Since we presume users have some method already in place to connect the client to the server, our principal focus is on looking at the disparity in database environments and integrating them through database middleware.

Doesn't middleware also keep users and developers from being locked into certain vendors' products or standards?

Definitely. As MIS managers and developers look at building applications today, there are so many decisions that need to be made. There are questions about which hardware platforms, network protocols, graphical user interfaces or DBMSs should be supported.

Within MIS, there is the general view that in making those decisions, the choices are always limiting because it's not possible to predict which products will be the most widely accepted. Since it can insulate users from being locked into any particular product or standard, middleware eliminates or minimizes this risk for MIS management.

With middleware and the corresponding independence it provides, what you're getting is leverage over a vendor. By not being dependent on vendors technically, that also means they can't dictate terms to you economically.

How does your concept of data-

“Our focus is on looking at the disparity in database environments and integrating them through middleware.”

▲▲▲

base middleware differ from the database gateways that have been out there for years?

The basic difference is that a gateway, from a technical point of view, is a fairly simple way to reach out and take information back in, but it doesn't allow the different DBMSs to be treated as peers.

So, even if you're using a gateway from Sybase [Inc.'s] SQL Server to get to Oracle [Corp.'s] Oracle Server, you are still principally building your application on a specific database, in this case, Sybase's SQL Server.

You wouldn't use a front end from one vendor, a database from another and gateways from a third if most of your data was held in one vendor's product. Gateways are used to just occasionally reach out and get data.

What we do in the database middleware area is treat all these DBMSs as equals or peers. When you build an application using the Trifox tools, you can be assured that the application will run optimally on each

one of the DBMSs supported.

That's why we believe that performance is a critical element of what we do because we can actually improve the performance of an application running in different database server environments.

By using our compiler for Oracle's SQL*Forms and our database middleware, for example, I can make an Oracle database application run faster on top of Oracle than if that same application was running in its native mode on top of Oracle.

We're going after the retrofit market, meaning we want to go into a customer site and fix a performance problem that already exists. With little or no work, we can recompile the application and allow them to add more users or see increased performance right away.

It's unusual to hear you say applications will run faster because most people assume that when you add a layer of system software, an application will run more slowly. What do you do?

One of the biggest obstacles we face in seeing this type of middleware deployed is the concept that it's another layer, so by definition, the application now runs inefficiently. That idea is not necessarily true. It depends on how you implement the application.

Another obstacle has to do with the fact that the database companies have approached this idea of performance by working on the underlying engine or server. To use an analogy, they are worried about how fast the engine goes in the car instead of being concerned about how the rest of the systems in the car interface with the engine.

When I buy a car, I don't just want to know the horsepower of the engine. I'm interested in knowing how fast I can drive that car and what the overall performance characteristics of the system will be. The database companies seem focused on publishing translation benchmarks, but that doesn't really translate into a benefit people can actually use.

At Trifox, we see that the problem goes beyond the engine. We found that it's actually the interaction between front-end development tools and back-end database servers that is actually a source of performance degradation. So what we do in our database middleware is optimize the interaction between tools and databases to achieve these performance gains.

What do you do in terms of the network to improve this interaction between front-end tools and back-end database servers?

At every layer of our technology, we are looking for ways to improve performance. For example, in the client/server environment, our Vortex product provides both client and server interface software. This software is designed to provide an interface between a front-end tool and a back-end server.

It utilizes our own application-level data-transfer protocol, which is much like Oracle's SQL*Net. But with this protocol, we are able to significantly increase throughput by providing a bulk transfer capability for moving data between the client and the server.

In addition, database administrators

can set parameters on how that bulk transfer is to take place. And our client software only takes up 2,000 bytes of memory as opposed to Oracle's SQL*Net, which takes up approximately 100K bytes on the client. As you can see, we're looking to optimize at each step along the way.

Who else provides database middleware?

Probably one of our biggest competitors is Information Builders, Inc., with its EDA/SQL connectivity software. There are other companies in Europe, including an English company called Pioneer that pro-

“One of our biggest competitors is Information Builders, Inc., with its EDA/SQL connectivity software.”

▲▲▲

vides an interface between Microsoft [Corp.'s] Windows and a series of back-end databases.

There are other middleware companies, but the focus with them is more on querying databases, whereas we are focused more on production applications.

In addition, these other companies focus on connections, not performance. We're focused on performance and applications interoperability.

What's holding back the development and deployment of distributed database applications?

I think the main issue is the vast differences in all the software technologies. For instance, making an application run on two vendors' databases is not easy, even though both of them claim to support SQL.

So what users need is software that masks all of those differences to support these applications. In a distributed environment, what you're typically going to be doing for now is retrofitting applications. That's the market today.

The problems users have today are much more basic than doing two-phase commits across an ocean. What people want to be really focusing on is getting better performance and interoperability out of their existing applications and their more conventional architectures.

So I believe more of the real issues for distributed applications will be solved in the retrofit market.

What are your long-term goals?

We plan to provide a complete development environment that will allow an MIS department to build enterprise or global applications that span heterogeneous databases.

If you look at the limitations involved from a technical perspective, nobody would set out today to build a distributed database unless there were some other overriding reasons to do so. Most of the push into distributed applications is going to come from tying together existing systems in an organization, and this will involve heterogeneous databases. □

Solutions for Today...

INTEROP

Beyond gets jump on cc:Mail in Notes race

continued from page 33

release this quarter. Version 3.0 will also incorporate some filtering features through Lotus' alliance with Verity, Inc., which develops text search and retrieval technology, he said.

BeyondMail for Lotus Notes has sophisticated filtering features that enable Notes users to scan and sort Notes messages into predefined files or forward messages to other users at specified times. This saves

users time sorting through potentially hundreds of messages, Digate said.

Access for non-Notes users

Most significantly, the BeyondMail software enables non-Notes users to access Notes documents stored in multiple Notes databases across a network as well as submit documents for storage in those databases.

In essence, BeyondMail can serve as a rudimentary front end to Notes, enabling BeyondMail users to participate in Notes sessions even if they do not have Notes

software.

"This positions BeyondMail to serve as an interface to a variety of information sources, including Notes, which becomes simply a data store," Marshak said. "This is a persuasive argument [to purchase BeyondMail] for many companies, especially those with a mixed environment [of Notes and LAN E-mail]."

BeyondMail for Lotus Notes consists of BeyondMail for Windows and a set of forms and rules for communicating with Notes called the Notes Connection Pack. BeyondMail for Notes software can reside

on a Notes client computer, an OS/2 server running Notes or a dedicated personal computer.

BeyondMail was integrated with Notes using the Notes application program interface (API) licensed from Lotus under the Lotus Notes Alliance Partner program, according to Digate. The API enables BeyondMail to use Notes' native query language to perform search and retrieval functions, according to Eugene Lee, director of product planning at Beyond.

To retrieve a Notes document, BeyondMail users draw up a profile of the document, specifying key words, topics or other information contained in fields in the document. A BeyondMail user agent scans Notes documents and sends all documents that match the profile to the requesting user in the form of an E-mail message. Conversely, the user agent can deliver Notes-like documents generated by BeyondMail to Notes databases.

Beyond has also synchronized the directories of Notes and BeyondMail so users do not have to update changes manually in the two address books.

It also lets remote users running BeyondMail Remote Access Edition software collect filtered Notes mail and documents. In comparison, remote Notes users must replicate Notes databases across a network to get the information they need, which costs more in long-distance phone or access charges, Digate said.

BeyondMail for Lotus Notes runs on Novell, Inc.'s Message Handling System (MHS) or Banyan Systems, Inc.'s VINES. A 10-user license costs \$995, and a 20-user license costs \$1,995. The BeyondMail Remote Access Edition costs \$295. □

Express delivery firm flies high with EDI

continued from page 33

nies to electronically link their order entry and shipping systems to Airborne Express. Joy Williams, customer automation consultant at Airborne Express, said Quick-Link can reduce by 75% the amount of programming required to implement EDI.

Customers can also use EDI to send remittances and payments to Airborne Express. Currently, 40% of all remittances the company receives are handled electronically, representing 10% of all payments made to the company. Customers can send remittances to Airborne Express via magnetic tape, dial-up or bisynchronous communications links, the National Automated Clearing House Association interbank network, or an electronic payment or value-added net provider.

Moreover, customers do not need to send a remittance if they can receive invoices electronically. Airborne Express generates a remittance from the original electronic invoice, allowing customers to send just a check with their customer account number and billing date on it.

This saves customers the time and expense of establishing an electronic remittance program, as well as from 5 to 25 cents per invoice item when sending remittances through the interbank network. It also saves Airborne Express the cost of manually processing paper-based remittances and eliminates errors due to re-keying. □

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Circle Reader Service #51



INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS, ALLIANCES AND FINANCIALS

Worth Noting

The benefits of the North American Free Trade Agreement (NAFTA) for U.S. vendors are great, according to the Telecommunications Industry Association. NAFTA has addressed many of the problems affecting U.S. telecommunications manufacturers in Mexico such as technical and standards issues, rules of origin and inflated tariffs.

Two foreign carriers team up in outsourcing venture

France Telecom, DBP Telekom partner in EUNETcom.

By Ellen Messmer
Washington Correspondent

PARIS — France Telecom, Inc. and Deutsche Bundespost (DBP) Telekom are expected to launch a global outsourcing company this February under the name EUNETcom that will offer managed network services to multinational corporations.

The two EUNETcom partners will initially focus on management of networks across Europe, but their long-term goal will be to expand their outsourcing venture to other parts of the globe, as well. EUNETcom will compete with

Syncordia Corp. and AT&T for corporate customers looking at outsourcing as a way to manage network links abroad without adding staff.

"We see EUNETcom as the vehicle for putting us on the map in the heated field of outsourcing," said Manuel Barbaro, director of sales for France Telecom. EUNETcom will have two headquarters, a corporate center in Paris and a technical center in Frankfurt, Germany.

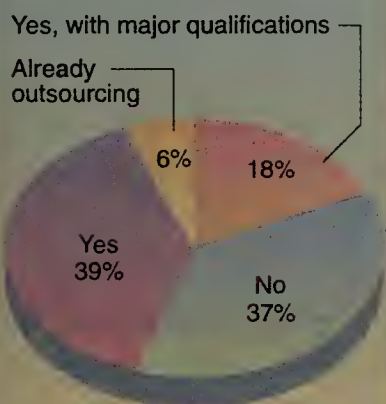
Don Hassenbein, vice-president of DBP Telekom, said the two carriers are negotiating the final details of the EUNETcom agreement and he would be able to comment on particulars following the official announcement. However, EUNETcom's initial intent will be to better serve business customers in Germany and France, he added.

"EUNETcom will have a full range of offerings," said Joe McQuaid, vice-president of sales and marketing at France Telecom. "We will do anything anyone tells us."

Among other things, EUNETcom plans to provide managed data links and switched data nets.

EUNETcom transmission services will be based on the 2M bit/sec fiber-optic Global European
(continued on page 41)

Would you consider outsourcing part of your network?



Based on responses from 100 European companies.

SOURCE: THE YANKEE GROUP, BOSTON
GRAPHIC BY SUSAN J. CHAMPENY

People & Positions

BT has announced a series of senior management changes, all of which become effective Oct. 19.

Mark Baker, president of BT North America, Inc. in San Jose, Calif., will leave that position to return to the U.K. as director of global customers for BT. He will have responsibility for BT's international business customers.

BT North America and BT's Atlanta-based outsourcing subsidiary, **Syncordia Corp.**, will become jointly managed under Syncordia President **Jerry Thames**. Thames will become president of BT North America, as well.

Anthony Booth, managing director of business communications at BT, and **Alfred Mockett**, managing director of special businesses, will swap jobs.

However, Booth will retain responsibility for international affairs.

Shiva Corp., a Cambridge, Mass., vendor of Apple
(continued on page 48)

For sale: hubs and routers

Internetworking vendors' sales and distribution strategies

Wiring hub vendors	Sales breakdown	Strategic partners
Cabletron Systems, Inc.	90% direct, 5% VARs, 5% systems integrators	Northern Telecom, Inc., Cincinnati Bell Information Systems, Inc., SSDS, Inc.
Chipcom Corp.	95% VARs/systems integrators, 5% direct and distributors	Digital Equipment Corp., IBM
SynOptics Communications, Inc.	50% VARs, 15% direct, 30% distributors, 5% systems integrators	Anixter Bros., Inc., Ascom Timeplex, Inc., Bell Canada
Ungermann-Bass, Inc.	70% direct, 30% indirect	BT, Siemens Nixdorf Informationsysteme AG, Pacific Bell
Router vendors	Sales breakdown	Strategic partners
Cisco Systems, Inc.	60% direct, 40% indirect	Cabletron, AT&T, NEC Corp.
Wellfleet Communications, Inc.	50% direct, 50% indirect	Bytex Corp., MCI Communications Corp., US West, Inc.

VAR = Value-added reseller

SOURCE: NETWORK WORLD

Balanced approach key in distribution

To remain on top, router, bridge, hub vendors are trying to find partners that will give them an edge.

By Bob Brown
Senior Editor

While the leading internetworking vendors are fighting a highly publicized battle for technical supremacy, they are also engaged in a lesser known tussle over distribution that may wind up being more important.

Analysts refused to choose winners and losers in the looming distribution battle but said router, bridge and wiring hub vendors that deploy a balanced approach of both direct and indirect sales are best poised to meet user needs. Those that have strong direct sales forces or team with large sales partners may have an early edge.

Realizing as much, vendors are scrambling to form a variety of partnerships. They are pairing with carriers to get a foothold at user sites that will use frame relay and other emerging services, teaming with systems integrators to target centralized purchasing groups and provide turnkey packages, and partnering with resellers to cost-effectively sell low-end products with thin profit margins.

"Users want to buy internetworking products through a number of different avenues," said Charlie Robbins, director of communications research at Aberdeen Group, Inc., a market research firm in Boston. "Vendors can have the best technology in the world, but it doesn't make any

difference if they can't market it to someone."

Chipcom Corp., a Southborough, Mass., hub maker, pulled off the distribution coup of the summer by announcing a technology and sales partnership with IBM.

But rivals Cabletron Systems, Inc. and SynOptics Communications, Inc. have not stood still. Cabletron teamed with Northern Telecom, Inc., and SynOptics inked relationships with Ascom Timeplex, Inc. and struggling Wang Laboratories, Inc.

Router vendors, such as Cisco Systems, Inc., have been busy lining up carrier partners, such as US West, Inc., to sell their gear.

"Nobody is going to survive without forging both technology and distribution alliances," said Rob Held, Chipcom's president and chief executive officer.

Direct approach

In the short term, vendors that sell products directly or with the help of large partners may be best positioned to survive the market battle, said Joe Gottlieb, a program director at the META Group, a Westport, Conn., consulting firm. Many companies demand direct relationships with their equipment vendors, he added.

Larry Gagler, director of communications at Home Box Office, based in New York, backed that up.

(continued on page 48)

INDUSTRY BRIEFS

Personal communicator vendor starts up. EO, Inc., a start-up company backed by several multinational firms, has announced plans to develop a combination pen-based computer and cellular phone that it calls a personal communicator. Specific plans will be announced by year end.

The Mountain View, Calif., start-up was founded by Bernard Lacroute, a former Sun Microsystems, Inc. executive, and has the backing of AT&T, Marubeni America, Matsushita and venture capital firm Kleiner Perkins Caufield & Byers. EO and its backers plan to promote standards for the emerging personal communicator market based on GO Corp.'s PenPoint operating system and AT&T's Hobbit microprocessor. EO also plans to sign on a European partner.

Wireless forum founded. A host of vendors in the mobile computing marketplace last week announced the formation of the Portable Computing and Communication Association (PCCA) at the Chicago Lap & Palmtop Portable Computing Exposition. The PCCA said its aim is to further increase the
(continued on page 48)

(WHEW!)



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DEC reorganizes as Palmer steps in

continued from page 11

desktops to wide-area networks.

"They need to rapidly enhance DECnet connectivity to Novell and TCP/IP clients," said Rick Villars, an analyst at International Data Corp. in Framingham, Mass. "Users have to believe their products are actually competitive."

Of the installed base of desktop clients — DOS, Windows, OS/2 and Unix machines — less than 10% use DECnet proto-

cols, Villars said.

Each market group in the revamped Networks and Communications division will have a business manager overseeing its operation, although none have been named yet. DEC will also try to foster more synergy among product management, marketing and engineering.

The Networks and Communications division is currently structured along product lines, such as FDDI concentrators, routers and Advantage Network software, rather than by vertical or horizontal industries. Moreover, product managers, mar-

keting managers and engineers for a particular product work autonomously.

Under the new alignment, those activities will be grouped together, DEC said, to coordinate and emphasize turnkey solutions comprising a variety of DEC products rather than individual product lines.

Michael Thurk, DEC vice-president of Networks and Communications, will continue to oversee the firm's networking activities, and Gail Daniels, director of Networks marketing, will continue to manage worldwide marketing of the division's networking products. **E**

Penril server reduces cost of asynch LAN ties

By Jim Duffy
Senior Editor

GAITHERSBURG, Md. — Penril Data-Comm Networks has brought out a new communications server designed to reduce the expense of connecting asynchronous devices to local-area networks.

Called WANserver, the new product combines statistical multiplexing, switching and terminal server functions in a single modular chassis. WANserver supports interface modules for asynchronous terminals and hosts, Ethernet LANs and wide-area network links.

One WANserver chassis supports from five to 19 slots for the interface modules. One asynchronous module supports 16 ports at 19.2K bit/sec for locally attached devices. The Ethernet module supports one Ethernet port and up to 120 Telnet, Digital Equipment Corp. Local Area Transport (LAT) or concurrent Telnet/LAT sessions.

The WAN module supports two RS-232, V.11 or V.35 interfaces at speeds up to 72K bit/sec, Penril said.

One WANserver node can house as many as 17 asynchronous boards supporting 272 asynchronous users, up to 10 Ethernet cards for a maximum of 1,200 Transmission Control Protocol/Internet Protocol Telnet or LAT protocol sessions, and as many as 17 trunk cards supporting 34 WAN links. The actual number of supported users, sessions and WAN connections is dependent on system configuration.

WANserver nodes can also be connected to each other at speeds of 128K bit/sec to support larger networks, according to Penril.

WANserver is intended to allow users to protect their investment in asynchronous devices as they install LANs. It allows users to connect asynchronous terminals and hosts to those LANs so they can share information with LAN-attached clients and servers. Asynchronous users can also share LAN-attached printers and modems, Penril said.

Usually, asynchronous devices and LANs are connected using separate terminal servers and statistical muxes. This can inflate equipment and line costs, and create more points of failure and performance problems, the company said.

WANserver consolidates the functions of those devices into one system to centralize management and reduce equipment and line costs.

WANserver is even less expensive than adding LAN cards to Penril's VCX asynchronous communications servers and configuring them as WANserver-like nodes, said Chuck Hardy, Penril's director of systems marketing.

Similarly configured VCXs cost about \$6,000 more than a five- or 19-slot WANserver, Hardy said.

The pricing for WANserver starts at \$12,995, and the product is available now. **E**

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SOME COMPANIES WILLING TO PAY FOR A IT'S THE ONLY

Design. Engineering. Testing. Service. Support. When you think about it, these are what make one computer better than the next. Which makes it all the more surprising that companies are cutting back in these areas. And, amazingly, some do little but stick their name on at the end of somebody else's assembly line.

It would be like buying a car, looking under the hood, and discovering that it was built by a company you'd never heard of from a place you'd have trouble finding on the map.

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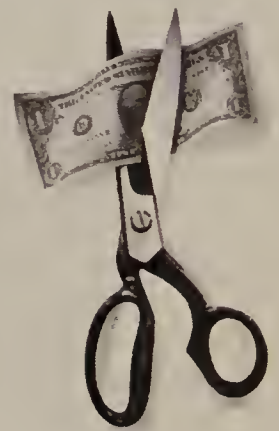
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Balanced approach key in distribution

continued from page 37

"Routers and hubs are very complex products, so we want direct access to our vendors, such as Cisco," he said. "We want to be clued in to future product directions and give feedback to the vendors to influence products."

Having a direct relationship with customers is part of Cabletron's ingrained philosophy, according to a company spokesman.

"We try to avoid having a filter between us and the customer," he said. "This is how we maintain customer loyalty." It also en-

Looking toward the future, even the most devout direct sales advocates seem to be realizing they cannot go it alone.

Cabletron's authorized distributorship agreement with Northern Telecom made earlier this summer is seen as a signal by some observers that the Rochester, N.H., hub vendor may be softening its stance on indirect sales.

A Cabletron spokesman, however, said the agreement is primarily for international sales, an area where most internetworking vendors rely on resellers and distributors because it is impossible for companies of their size to have offices worldwide.

Cisco is making a more pronounced move to a multidimensional sales and distribution strategy, said Doug Tsui, marketing manager at the Menlo Park, Calif., router vendor. The company is partnering with numerous local-area network hub vendors and carriers to sell its wares.

Changes in the market, such as the rollout of low-end products, have forced Cisco and others to reevaluate their strategies, Tsui said. "When you start selling products that cost just a few hundred dol-

lars, it's tough to sell them direct" because the profit margins are too low, he explained.

Tough balancing act

Creating a more balanced sales and distribution strategy is important for vendors in their effort to build an installed base, META Group's Gottlieb said. Vendors are building a foundation for future high-end and high-volume product sales by getting low-end products into small sites and companies that may grow into larger customers over time, he said.

According to Aberdeen Group's Robbins, the internetworking vendors, many of which emerged over the past five years or so, are starting to show some maturity by focusing more of their time and money

on establishing sound sales and distribution plans.

SynOptics and Wellfleet Communications, Inc. have put in place programs during the past 18 months to strengthen the mix of their sales and distribution setup.

SynOptics, whose channel strategy was criticized by financial analysts last year when the company's numbers began to sag, is now being applauded for turning its strategy around.

"The problem was that we didn't really have a channel strategy," said Dave Cote, director of segment marketing for SynOptics.

In June, SynOptics put in place a Qualified Partners Program, designed to establish a closer relationship with resellers and to reward value-added resellers and distributors for selling SynOptics gear. The program involves incentives, including product discounts, for resellers and distributors that focus on providing excellent support and service, Cote said.

Wellfleet, which previously emphasized direct sales, has implemented a wide-ranging effort to better attune its sales and distribution strategy to meet user needs. Much of the plan was based on the results of a survey of more than 200 users conducted in May 1991 by the vendor.

"Based on changes in the marketplace, we decided it was important for Wellfleet to invest in a hybrid strategy," said Gary Bowen, senior vice-president of sales and marketing at Wellfleet, which is based in Bedford, Mass.

For users that have the people, skills and time to build their own networks — typically large companies — Wellfleet provides direct sales support, Bowen said. For users that need a lot of assistance or want to outsource network projects to vendors, Wellfleet has teamed with net and systems integrators.

"We have no plans to get into the integration business ourselves," he said. "You need to be a company like AT&T or Northern Telecom to provide that level of integration and support." ■

"Nobody is going to survive without forging both technology and distribution alliances."

Rob Held
President and CEO
Chipcom Corp.



ables customers to tell Cabletron which way the market is going, he added.

Bob Jordan, director of marketing at Ungermann-Bass, Inc., said his firm keys in on direct sales to large customers because "[we] deal with enterprise network users and they tend to want long-term contracts and are looking for a partner."

Among the special accommodations UB is making to better serve these customers is the implementation of an electronic data interchange system through which users can order products, Jordan said.

Direct sales as well as partnerships with large systems integrators and vendors also help vendors deal with central purchasing groups headed up by executives who are used to dealing with big suppliers, according to Gottlieb.

People & Positions

continued from page 37

Computer, Inc. Macintosh communications products, has named **Woody Benson** vice-president of North American sales.

Previously, Benson was director of sales and marketing for portable computing products at Lotus Development Corp.

Steve Russell, one of Vitalink Communications Corp.'s three founders, has been named vice-president of engineering of **3Com Corp.**'s Network Systems Division, which is responsible for the company's internetworking products. Russell will be responsible for product development and engineering for 3Com's routers and hubs. Previously, he was a founder of Riverrun Technology, a Menlo Park, Calif., start-up.

Russell is filling a position vacated by Eugene Buechele, who left the company recently.

MCI Communications Corp. has named **James Zucco** to the newly created position of senior vice-president of future

network and systems architecture. He will manage MCI's systems engineering organization, and his responsibilities will include deploying new services on MCI's network, research and development, and the carrier's five data centers.

Previously, Zucco was vice-president of advanced product development in the carrier's systems engineering organization. **James Hoffman**, previously senior vice-president of engineering support services at MCI, will replace Zucco.

Separately, MCI last week named **Judith Areen**, executive vice-president of law affairs at Georgetown University and dean of its law school, to the company's board of directors.

Davox Corp., a Billerica, Mass.-based vendor of autodialing equipment, has named **Ellen Chang** vice-president of marketing. She will be responsible for the company's marketing plans and direction.

Previously, Chang was vice-president of sales for the Eastern region at Digital Systems International, Inc.

Chang replaces Paul Johns, who has taken a senior sales management position within Davox's end-user sales force. ■

Industry Briefs

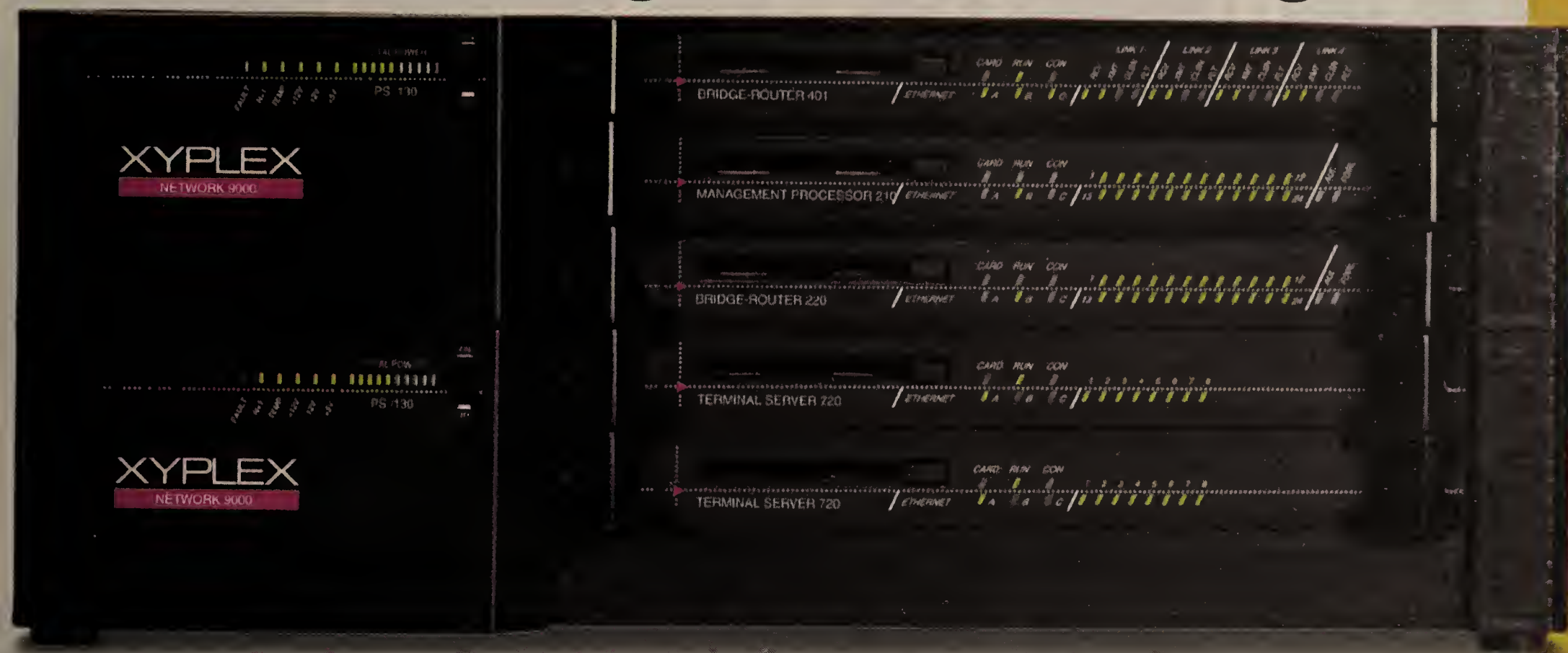
continued from page 37

speed of market growth in the already fast-growing portable computing market. AT&T, Hewlett-Packard Co., IBM, Intel Corp. and Lotus Development Corp. are among the PCCA's members.

On the move. Southwestern Bell Corp. has announced it will move its corporate headquarters from St. Louis to San Antonio, Texas, by March 1993. The move will put the regional Bell holding company closer to some of its major growth areas, including Mexico. Southwestern Bell owns 10% of the Mexican phone company.

IDB secures buy approvals. IDB Communications Group, Inc. of Los Angeles has announced that it has received all necessary Federal Communications Commission approvals for the acquisition of World Communications, Inc. (WorldCom), the U.S. subsidiary of Switzerland-based TeleColumbus AG. The acquisition, which will give IDB about 7% of the global private-line market, is expected to take full effect at the start of 1993. ■

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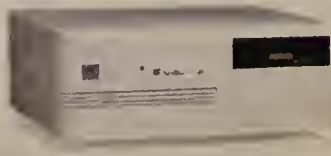
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Worth Noting

“We’re moving to LANs [from a minicomputer] because the tools tend to be more flexible. Windows-like GUIs don’t exist on the mini. We’ve attempted to write them, but it’s very difficult to write the same kind of interface you can get on a PC for just \$49.”

Pat Coen
Vice-president of
information systems
Reed Exhibitions Co.
Newton, Mass.

Manager Minutes

Delphi Consulting Group is offering a series of three-day conferences on Electronic Document Management Systems at various cities starting this month and running through January.

The conferences provide an overview of the options and issues to consider when evaluating the implementation of imaging, text retrieval, work flow and multimedia applications. Participants may attend lectures and hear case studies, as well as learn methods for designing advanced electronic document management systems. Conferences are scheduled to begin Oct. 19 in Chicago, Nov. 9 in Denver, Dec. 8 in Boston, Jan. 12 in Toronto and Jan. 26 in Washington, D.C.

In addition to the three-day seminars, Delphi is offering an optional fourth day devoted to designing and managing a document management system request for proposal.

For more information or to register, contact Delphi at (617) 247-1025. ■

Bank puts its trust in outsourcing

User: California Republic Bank
Outsourcing vendor: Unisys Corp.
Contract: \$56 million over 10 years
Outsourced: All information systems functions, including responsibility for future data net upgrade and branch LAN installations
Personnel changes: All bank data center personnel hired by Unisys

GRAPHIC BY TERRI MITCHELL

SOURCE: CALIFORNIA REPUBLIC BANK, BAKERSFIELD, CALIF.

Bank off-loads data center, network upgrade to Unisys

Hopes deal will provide updated net at lower cost.

By Joanne Cummings
Senior Writer

BAKERSFIELD, Calif. — California Republic Bank, based here, announced it has turned over all of its information systems (IS) operations to Unisys Corp. as part of a 10-year, \$56 million outsourcing deal.

The move is intended to enable the bank to control its costs while it upgrades its analog data network to digital fractional T-1 and installs local-area networks in 14 branch offices scattered throughout the state.

California Republic hopes the arrangement will give it access to the latest network technology without having to lay out a large capital investment, said Bruce Roat, chief financial officer at the bank.

“We saw it as a way to cap our IS costs,” Roat said. “We foresaw steady increases in capital expenditures if we kept the IS function in-house, and this way, we felt we could better control our spending over time.”

In addition to taking over the applications support and maintenance of the bank’s two Unisys mainframes, the deal calls for Unisys to upgrade the bank’s aging data communications network (see graphic, this page).

“This is not simply a facilities management agreement,” Roat said. “They have agreed to take on our data center as a business and are committed to upgrading the network.”

Currently, terminals at California Republic’s various branch offices communicate with the data center mainframes here via

9.6K bit/sec analog multidrop lines. Under the outsourcing arrangement, Unisys has agreed to upgrade the bank net to digital, point-to-point fractional T-1 lines running at between 19.2K and 56K bit/sec.

In addition, Unisys will install LANs at each branch site, enabling the bank to automate several tasks, including the filing of

“This is not simply a facilities management agreement,” Roat said.

▲▲▲

loan applications and registering of new accounts.

For example, branch officers currently process most paperwork concerning loan applications by hand. The data is later keyed in to terminals by support personnel and uploaded nightly to a centralized database on the data center mainframe.

The mainframe creates a customer profile containing information about the person’s accounts at other branches and prior loan applications. The profile is then sent back to the branch, where the officer can use the information to either approve or reject the loan.

Once the bank installs the digital wide-area network and the
(continued on page 59)

Customer service software offers edge

Clarify client/server packs help companies resolve customer complaints and track product defects.

By Joanne Cummings
Senior Writer

SAN JOSE, Calif. — Unlike the 1970s and ’80s, when large corporations sought a competitive edge by automating finance and manufacturing, today’s businesses are looking to streamline customer service as a way of keeping their current customers satisfied and attracting new ones.

Responding to this trend, Clarify, Inc. last week unveiled a line of client/server software designed to help large customer service organizations track customer complaints, product defects and fixes, parts inventory, and other technical support functions.

The software forges links between customer service and other departments, such as product engineering and finance, to speed customer complaint resolution and update parts inventory.

“Improved customer satisfaction is the ultimate goal,” said David Stamm, president of Clarify.

The software consists of three products: the ClearSupport technical support management module, the ClearQuality defect tracking system, and the ClearLogistics field service and inventory management module.

When used together, they enable a corporation’s entire customer and technical support staff to handle customer calls more efficiently, better track known product problems, schedule repairs in a timely manner and keep departments such as engineering apprised of potential and recurring problems.

The products’ client portions run on Apple Computer, Inc. Macintoshes, personal computers running Microsoft Corp.’s Windows or Unix workstations running the Motif graphical user interface. The server consists of a shared SQL-based database, including those from Oracle Corp. and Sybase, Inc., which can be licensed from Clarify.

Most of the application code,
(continued on page 58)

EXECUTIVE BRIEFS

ISDN user group formed. Washington, D.C.-area users of Integrated Services Digital Networks are forming the Washington ISDN Users Group (WIUG). The group’s charter will be to provide the Washington user community with a forum for exchanging ideas, information and experiences about ISDN.

The first meeting of the WIUG is planned for Nov. 19 at the National Institute for Standards and Technology in Gaithersburg, Md.

For more information, contact the WIUG steering committee at (301) 469-0085.

Explaining emerging database technologies. Technology Transfer Institute (TTI) is sponsoring a series of technical seminars this fall and winter on emerging database technologies. TTI is holding two database seminars, both of which will be taught by Shaku Atre, president of Atre Consultants, Inc. in Rye, N.Y. The first, called Distributed Databases, Cooperative Processing and Networking, will define the elements that comprise a distributed database environment and the features that a successful implementation must have. The second seminar is titled Object-Oriented Databases and Programming. Atre will explain what object-oriented means, how it differs from relational technology and how it applies to databases.

The seminars are priced at \$895 each. For more information, contact TTI at (310) 394-8305. ■



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UB chief views ATM as the tie that binds

continued from page 17

Some time ago, we announced we would be developing a major product with BBN Communications. It will be a hub of hubs using ATM technology to provide better connectivity to the different worlds but will still provide interfaces and switching capabilities between Ethernet, token ring and the installed base you have already.

Will this hub of hubs be based on a cross-matrix switch or be more of a bus-based system?

It uses ATM technology that BBN developed, which is a switch based on cross-point technology. We're putting the interfaces to all the LAN elements on top of that. Then we're taking the best of ATM and integrating it very tightly with the LAN and WAN interfaces. We can use the high-speed switching capability of ATM but still support the entire existing infrastructure.

We'll then develop a number of products that will deliver real-time multimedia applications to the desktop using switched Ethernet technology.

What is the real quantifier in migrating to ATM? Fewer routers or multiplexers?

Today, if you look at the way networks are being built, you have hubs and maybe a router that ties together all the hubs. The router will be talking to a T-1 multiplexer [supporting] some point-to-point circuits. The multiprotocol routers have to [look at] every packet going through this system and figure out what it is and where it's going.

The allure of ATM is it's a very high-speed switch, so you don't have to do all this multiprotocol routing. It simplifies how you link things together. That's the goal of ATM: to use that high-speed switching capability to provide fast connectivity through the network. It will likely have a big impact on T-1 multiplexer, WAN and router companies. All those functions will now be able to come into a single box, so it kind of becomes this premises backbone. As PBXs and workstations get ATM, the connectivity will become global from desktop to desktop. Network management will

also become much more seamless.

The lines then between LANs and WANs will begin to blur. Doesn't that change our whole concept of networking?

Yes, it does. That's why it's so incredibly important that we harness this technology and be part of it because it absolutely does change all the boundaries that exist today. You hear about those big disruptions that happen in an industry? This is one of those major shifts in direction.

What makes ATM different from other technologies such as Fiber Distributed Data Interface that were touted as the final solution when they emerged?

FDDI is a computer networking technology, which is important today because it's a good backbone technology. It doesn't work in WANs, PBXs or multimedia envi-

“ATM is like DOS or Windows: It's something we have to build on and add our value on top.”



ronments, and it's clear that the desktop is going to be multimedia. We can't have all these different technologies hanging around our organizations long term. It's just not the way to do it.

ATM has been developed over the last 10 or 15 years with tens of billions of dollars. Researchers say they see another \$50 billion in R&D being focused on ATM by the telecom companies. ATM technology is distance- and media-independent and was originally going to be used for WANs. The LAN people then said, "This is a great technology for LANs. Let's make it the basis for LANs." All those things have caused the industry to embrace ATM.

So who calls the shots?

To me, there's no question that every-

body in the communications industry realizes that the only way you can survive is to jump on a really open standard, run with it and add value on top of it.

While the carriers have certainly not done that with things such as narrowband ISDN, they will do that with broadband ISDN.

You see that now with [Switched Multi-megabit Data Service]. All the [Bell operating companies] agreed that they would have a similarly priced, totally compatible service and add value-added features on top. But they're not trying to control the standards anymore.

It seems like we have a clear path in utilizing ATM worldwide as a key underlying technology. It's like DOS or Windows: It's something we have to build on and add our value on top.

When can we expect to see ATM products?

From us, by the second half of next year. You'll see ATM products popping out in the industry in a big way next year and becoming mainstream by 1995.

There are some wide-area people talking about rolling out an ATM service next year, as well. A premises backbone will be the first application. The real wide-area global service won't be here until 1995.

The advantages of ATM as a backbone technology are obvious. The cost issues of replacing Ethernet are tremendous, though.

Is the technology ahead of the applications at this point?

There's certainly a lot of work to do on the applications side in terms of interfaces. I don't think they're seriously out of sync, but there's a lot of work to be done because the focus of ATM has been on the carrier side and not the communications side.

Is ATM strictly a fiber technology?

No, ATM is really speed-independent. You can have ATM starting at 45M bit/sec, and that will obviously run over telephone wire.

The number that everyone is focusing on is 155M bit/sec as a starting point. They'd like to run that over UTP, so you can still use the structured telephone wire. It's possible but expensive. ▢

Magnalink joins bridge maker ranks

continued from page 17

equipped with a traffic customization feature that allows net administrators to filter out unnecessary traffic such as broadcast messages, leaving more bandwidth for data. It also enables users to prioritize traffic so that an interactive session is given precedence over a file-transfer application, for instance.

Both bridges support the source routing bridging algorithm and can be managed from any Simple Network Management Protocol-based management station.

Price tag

Pricing for the Series 3000 and 4000 token-ring bridges starts at \$5,450 for the single-port T-1 model. A high-speed compression model that delivers throughput of 3M to 6M bit/sec over a T-1 line costs

\$9,400. The DES encryption option costs \$2,500.

All of the bridge models are available now.

For more information, contact Magnalink at (617) 255-9400. ▢

Link Notes

continued from page 17

mcc) Director 1.2 (Ulrix), DEC's enterprise management platform, and DECmcc Management Station for Ulrix, a Unix-based network management tool for Transmission Control Protocol/Internet Protocol and DECnet network management. Chipcom also plans to demonstrate its ONdemand NCS package at Interop '92 Fall. Pricing has not been set.

Zenith Communication Products will unveil at this week's Network 92 Dal-

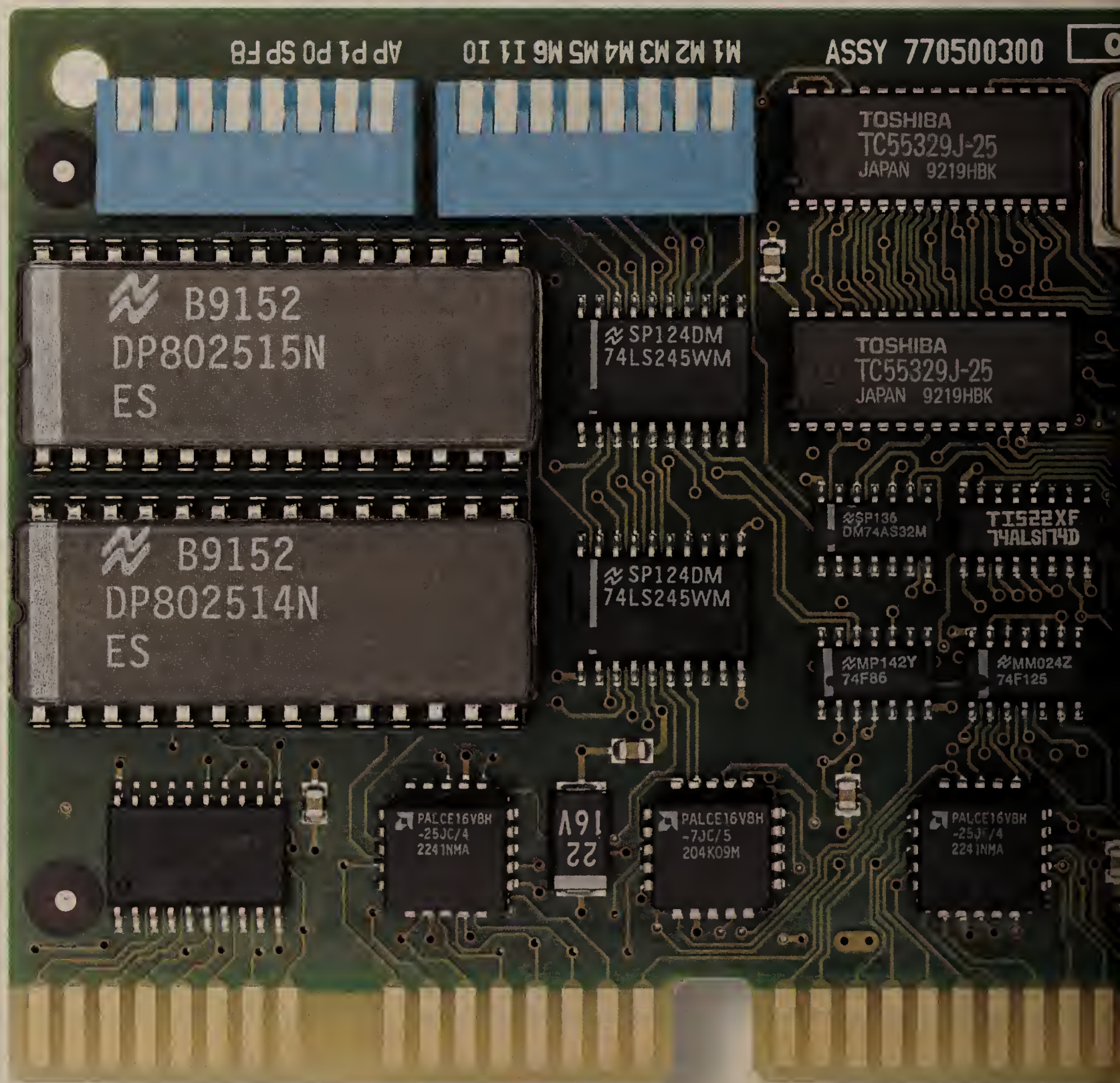
las show an Ethernet 10Base-T work group hub. The Office Exchange LANHUB-8E is an unmanaged, 8-port hub that is equipped with an extra Ethernet port for linking hubs. A triple-port expansion option offers a user-selectable interface for 10Base5, 10Base2 or 10Base-T. The hub costs \$545 and is compatible with Zenith's higher end Enterprise Exchange intelligent hub. For more information, call (708) 391-8181.

Network Application Technology has announced the LANB/290 Remote IP Router, a bridge/router for linking remote Internet Protocol-based Ethernet local-area networks to multiprotocol routers.

Each LANB/290 provides one Ethernet port, which may be 10Base2, 10Base-T or an attachment unit interface connection, and one wide-area interface, including RS-232, RS-422, RS-449, V.35, X.21 or G.703. It is available now and costs \$2,995. For more details, call (800) 543-8887. ▢

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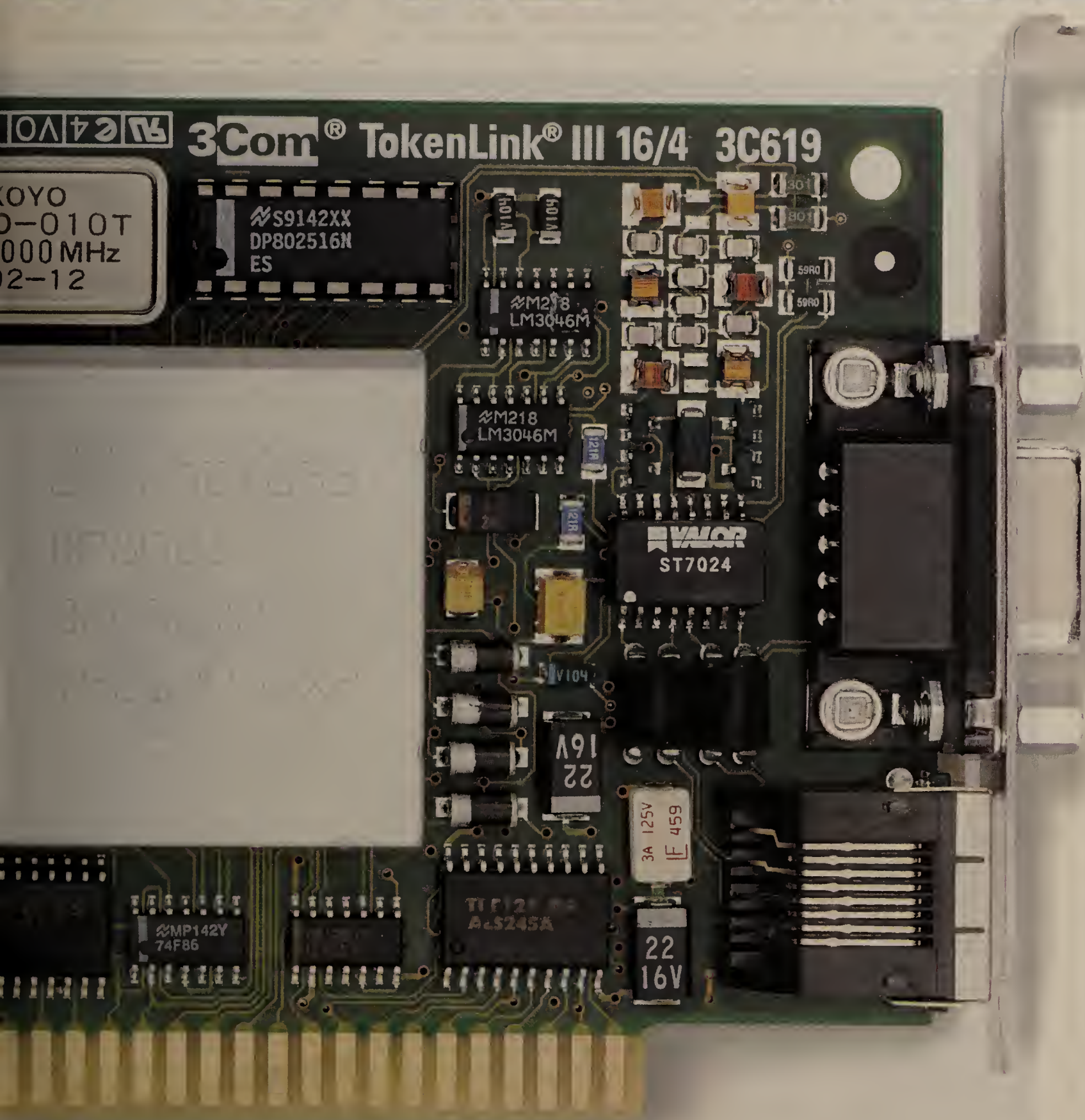
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Imaging will push user move to broadband services, study says

Health care industry tops list of early broadband service users.

By Joanne Cummings
Senior Writer

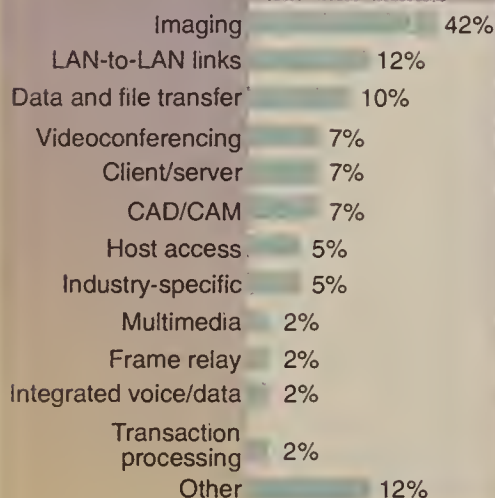
NEWTON, Mass. — Users planning to transmit imaging data, especially magnetic resonance images (MRI) and X-rays, will be spurring demand for carrier-provided broadband services within the next few years, according to a recent survey by Business Research Group, based here.

Of the 250 MIS and telecommunications managers surveyed, 42% said they will require broadband services for imaging applications, while others cited local-area network interconnection and full-motion videoconferencing as applications that will require broadband (see graphic, this page).

Imaging pushes the move to broadband

Users plan to move to high-bandwidth applications within 2 years, spurring the need for broadband services.

Planned applications requiring a minimum transmission speed of T-1:



Figures are based on responses from 250 MIS and telecommunications managers.

SOURCE: BUSINESS RESEARCH GROUP, NEWTON, MASS.
GRAPHIC BY TERRI MITCHELL

Business Research Group defines broadband as services supporting speeds of T-1 or higher.

Respondents were from six industries: health care, banking, insurance, hospitality, process manufacturing and discrete manufacturing.

Of the 17% planning in the next two to three years to implement applications requiring broadband services, 36% were from the health care industry, the study found.

Together with users in insurance and discrete manufacturing, these users accounted for nearly 70% of those needing broadband services in the near future.

Companies in that 70% represent early adopters of broadband services, and they are chiefly firms with more than 5,000 employees and telecommunications budgets averaging about \$10 million, the study said.

The hospitality industry, including companies operating hotels and airlines, will be the slowest to move to broadband, with just 2% citing a need for such services within the next two to three years. This is because the bulk of their traffic is for reser-

vations applications, which do not require a large amount of bandwidth, according to the survey.

For more information or a copy of the study, contact Business Research Group at (617) 630-3900. ■

Customer service software offers edge

continued from page 51

such as policy management tools and work flow software, runs on the client, reducing server and network bottlenecks. Clients can be attached to the server via local-area networks or communicate via wide-area leased and dial-up lines.

Each product includes a policy management tool that lets administrators set up and define user access rights within the Clarify environment, whether only one

product or all three are used. It enables them to define work flow paths and task notification facilities such as pop-up windows or electronic mail.

The products also have Desktop software that identifies each Clarify user and manages user-defined tasks such as researching a product defect, writing debugging code and informing the customer of a fix.

Tasks are managed through a series of queues and work-in-process (WIP) bins on each user's desktop.

With Desktop, users can review activi-



ties in a queue or WIP bin, view a to-do list or monitor the status of a customer request or product defect report.

In addition, the products all have a query tool that enables users to search for and retrieve specific customer information from the database without having to learn SQL commands.

ClearSupport works with any Aspect Telecommunications Corp. automatic call distributor, enabling customer support personnel to bring up a customer's file at the same time the customer's call, called a case, is passed to their workstation.

ClearSupport lets customer representatives log cases and record notes on a conversation, as well as review the customer's history and other cases the customer might have pending, helping them determine how best to route the call.

The product also maintains an activity log for each case, tracking phone time, research time and activities, field service time and parts used, as well as all the accumulated costs.

ClearSupport comes with artificial intelligence-based software, called the Diagnosis Engine, that matches customer prob-

lems with solutions. As the software is used, it collects information about problems and how they were solved, and makes this information available to customer support representatives to help speed resolution time.

The engine also tracks which customers have been given which solutions, ensuring that problems are recognized and not addressed multiple times.

The second module, ClearQuality, is a defect tracking system designed for use by product development and support departments. It enables users to record and main-

tain a history of all defect-related information, such as the customer who reported the problem, a product description and the defect severity. It enables product development teams to attach code samples, debugging files or other diagnostics to each defect report, and ensures that problems are addressed by reminding personnel about impending deadlines via electronic mail.

ClearLogistics manages customer service-related inventory, maintaining parts information and tracking the costs associated with service repairs. It lets field engineers check for parts availability, transfer parts between sites, manage inventory levels and log repair activities. It can be linked to a company's billing system to help field engineers quote and bill for repair jobs accurately.

A typical ClearSupport configuration, including ClearSupport, the Diagnosis Engine and all necessary database licenses, has an average price of \$5,000 per concurrent user.

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The product maintains an activity log for each case, tracking time and activities, as well as all the costs.



rent user. ClearQuality, including interfaces to ClearSupport, has an average cost of about \$4,000 per concurrent user. Pricing for ClearLogistics has not been set, and the product will not be available until the first quarter of next year. ClearSupport and ClearQuality are currently available. ■

Bank off-loads data center, net upgrade

continued from page 51

branch LANs, Unisys will equip each branch with Financial System Architecture (FSA) software. FSA enables a branch officer at a LAN-attached personal computer to directly key in a customer's loan application information, eliminating the paper forms. Then, within seconds, the information is processed by the mainframe and the customer profile is returned to the officer. This will cut the loan approval process down from days to just minutes, Unisys said.

In addition to the network upgrade, Unisys will also be installing executive information system software, called Mapper, at the bank's headquarters that will enable senior-level executives to query the centralized database and receive reports about the bank's day-to-day operations in real time. For example, an executive could have an automated set of queries that show at a glance whether deposits have gone up or down that day or how many new loans have been approved that week. "It provides them with a snapshot of information so they can make better informed decisions," said Ken MacMillan, Unisys' program manager in charge of the bank's data center. ■

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HP LaserJet III	HP JetDirect®	174.6 seconds	22.0 seconds	384.4 seconds
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LAN APPLICATIONS

BY DOUGLAS E. WELCH

Take do-it-yourself approach to building LAN apps

Finding turnkey network applications that meet users' needs is becoming increasingly difficult as software vendors focus on peddling development tools that place programming chores in the end-user camp. Companies that want to maintain an edge in today's tough business climate need to accept this as a fact of life and begin building a strong in-house development team capable of utilizing these tools.

For instance, companies need to get critical data to the desktop as quickly as possible. Large centralized databases, such as those made by Oracle Corp., offer the best way to store data on a server, but it is left up to in-house development groups to build front-end applications that make this data accessible from clients. A client/server database without a usable front end is as crippled as the overutilized mainframe system it was probably designed to replace.

A good source of programming talent is already available in most companies.

▲▲▲

nies. Mainframe programmers should be retrained to bring their development knowledge to local-area network projects.

Many companies will be looking to consolidate the data that is now roaming the free range of the network and harness it for everyone. Most firms have LANs installed throughout the enterprise and personal computers on nearly every desk. They have a way to deliver data; now they need a way to present it to the user.

But developers of LAN applications cannot be the typical mainframe programmers that are shackled by limited system resources and huge application backlogs. They need to form small, project-oriented groups that can turn out quality prototypes and finished systems quickly. These developers will be the driving force for the next boost of corporate productivity. Like a solutions hit squad, they will have the training and freedom to act quickly to get the users what they need.

This new direction in the industry is catching most companies by surprise. Their development staffs are still struggling to turn out mainframe applications and reports when they should be learning about client/server and network programming.

In order to adapt to this new direction, companies will have to develop LAN programming talent from within. Companies will have to take an active role in reeducating mainframe programmers, recruiting interns and developing a training curriculum to allow their people to grow into this new role.

If companies truly want to move with the times, they must see the need for developing their own information solutions. Successful companies know more about their data needs than any outsider. Businesses need to begin developing the strategic systems that will keep them ahead of the game and their competitors — otherwise, they won't be competitive for long. ■

Welch is a support analyst for a major entertainment corporation in Los Angeles.

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EDITORIAL

It isn't the buzzword, but the work effort that counts

The unfortunate thing about buzzwords is they distort reality.

Take downsizing. Since the term was coined, it has grown to almost mythical proportions, having become intertwined with the rhetoric of the local-area network revolution. Angry users, tired of the high costs of mainframe computing, have scrapped their big iron in favor of personal computer networks and have raked in the savings.

But downsizing's a simplistic label, and it doesn't give users much credit.

At a Sun Microsystems, Inc.-sponsored roundtable last week, network executives from some major West Coast companies talked about the challenges and opportunities of moving to distributed LAN environments.

The users, including Wells Fargo Bank, Northwest Natural Gas Co., the Fred Hutchinson Cancer Research Center and Blue Shield of California, didn't describe their efforts as downsizing — or rightsizing, the term Sun used to promote the get-together. Rather, they seem to be saying the move to distributed computing hasn't been a quick fix that has resulted in rapid savings. In fact, it has meant higher costs, given the hidden expenses of training, among other things.

Instead, these managers discussed making the commitment to open systems and developing a network and computing infrastructure that supports reengineering of business operations.

Did they say open systems? Yes, they used that battered

term, which has been prostituted by vendors, disparaged by critics and pooh-poohed by pundits. Open systems doesn't mean much to some people, but in a sense, users are forced to move to open systems to meet the changing needs of their businesses. However, they're not scrapping existing systems entirely. The move is neither easy nor cheap.

Downsizing, rightsizing — we're even hearing about upsizing. (Don't ask.) These terms lose their value through overuse and hype. By relying on such simplistic terms, we devalue the tough work network professionals are doing to bring information systems in line with business realities and demean their vision of a better future. ■

OPINIONS

MACROSCOPE

BY JAMES KOBIELUS

Communications technology makes for gov't for the people



Government agencies exist to serve the people, and their communications strategies should reflect this fact. Unfortunately, government communications professionals tend to lose sight of the ultimate customer for their agencies' services: taxpayers.

Communications could help the U.S. realize the promise of a government by, for and of the people, if only the government would deploy the technology appropriately. For government network managers, the most critical step toward this end is to articulate a different vision of how communications supports their agency's mission, programs and constituents. In developing public service support strategies, government communications professionals should address several important considerations.

First, they should use communications to involve constituents in the processes of governance — voting, speaking out, petitioning, testifying, influencing policy and keeping tabs on their elected representatives. Government officials should look into implementing televoting from convenient public kiosks, with fraud protection provided by smart card technology; regularly polling electorate and public opinion using 800 and 900 numbers; using audio and videoconferencing systems to obtain expert testimony for legislative hearings instead of requiring experts to travel; allowing interest groups to post briefs and position papers to agency computer bulletin boards, where they might be accessed by policymakers and other interested personnel; and placing all gov-

ernment agencies' daily public schedules on computer and audio bulletin boards so that lobbyists and other interested parties could plan their days effectively.

Second, the government should use communications technology to provide easy access to public information resources. All agency-held information could be made accessible to constituents through user-friendly voice and data applications — except, of course, information that must be kept under

Imagine the benefits if government agencies implement electronic data interchange.



wraps for security, privacy, law enforcement and other legitimate purposes.

Applications that would assist government officials in reaching this goal include using an operator-assisted or automated locator system that would place callers in touch with the assistance they seek within the government labyrinth; providing low- or no-cost computer access to agency databases via commercial value-added networks or through government networks such as the proposed National Research and Education Network; and making all government news releases, policy statements and other short documents available instantly to all interested citizens as facsimiles that could be transmitted automatically through push-button commands made in response to telephone voice prompts.

Third, government communications managers should use technology to speed and simplify the often tedious process of conducting transactions with the government. Technology would come in handy in such areas as forms processing, manual filing of paper documents and providing goods and services.

People hate to fill out government forms, an undeniable fact that has spawned, among other things, the federal Paperwork Reduction Act and related initiatives at the state and local levels.

Manual file systems are probably the biggest single factor behind the rampant disorganization for which governments everywhere have long been notorious.

Agencies should use image management systems to scan their mountains of paper documents into optical storage.

And imagine the benefits if government agencies implement electronic data interchange for exchanging purchase orders, invoices and other business documents. Government — a term encompassing federal, state and local agencies — is the most pervasive industry in the country. Almost every firm provides goods or services to government agencies.

The time has come for government network managers to rededicate their careers and their operations to public service. Managers of federal, state and local government networks should refocus their efforts on supporting their agencies' constituents at least as well as they serve the bureaucrats. **■**

Kobiellus, a contributing editor to Network World, is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., a local- and wide-area network systems integrator.

TELETOONS

BY FRANK AND TROISE

The Network Manager's Handbook Suggestion 104.

Don't rely solely on formal training to further your career. Ask broad technical questions of any experts you encounter in the workplace:



LETTERS

FBI has tapping power now

I agree with your recent editorial against the Federal Bureau of Investigation's proposed new wiretap law ("Help smother the FBI's primal scream," *NW*, Sept. 28). I'd like to add some comments.

The FBI has access to the sources of data communications it wishes to monitor. The FBI can tap into communications lines at the sources before any digitization takes place, tapping the phone line a modem call is being made on or intercepting a data stream from a PC before it is merged onto a digital circuit. For voice, the FBI just needs to tap the phone.

Yes, the FBI could monitor communications from a central site more easily, but at least it can now monitor communications.

Craig Paul

Hats off to the government
Congratulations to the Gov-

ernment Printing Office for trying to save a tree by establishing the Federal Bulletin Board to distribute federal documents electronically ("Government Printing Office brings its mission on-line," *NW*, Sept. 21).

This is a good start to getting the federal government to communicate with the citizens using computers. I agree with Sen. Al Gore's (D-Tenn.) proposal to place this service on the Internet so we can use the File Transfer Protocol to access any documents needed. A file transfer over the Internet is a lot more reliable than depending on the U.S. Postal Service. The Bush administration's comment that these inroads are unfair to private companies is not true since private companies can access the Federal Bulletin Board on behalf of the citizens who would rather not use computer communications.

Mike Tomlianovich
Bloomington, Ill.

Want to respond to an article or opinion in Network World? Mail typed letters to Editor, Network World, 161 Worcester Road, Framingham, Mass. 01701, or fax them to (508) 820-3467. Transmit your response via MCI Mail at 390-4868 or to our Bulletin Board System. (See page 2 for BBS instructions.) Letters may be edited for space and clarity.

ATTENTION SWITCHED DIGITAL DATA SERVICE PROVIDERS: *Network World* would like to list your service in a Buyer's Guide being published Nov. 9, which will provide selection criteria for purchasing switched digital data services from interexchange and local exchange carriers.

To obtain a survey form, call Charles Bruno, features editor, at (508) 820-7414 or Mark Langner, an associate at Telechoice, Inc., at (201) 746-0200. Requests for survey forms must be received by Friday, Oct. 16.

When Routing LAN And Mainframe Traffic, LAN*TMS Runs Rings Around Everything Else.

Internetworking often presents major problems in a Token Ring environment. To date, users have lacked an efficient way to integrate distributed LAN applications with mainframe SNA traffic.

Now LAN*TMS, a powerful new router from General DataComm, provides the solution. Users report that its unique routing architecture can "route the unroutable," including SNA and IBM LAN protocols such as NetBIOS, without the need to encapsulate them in TCP/IP or other protocols.

So LAN*TMS doesn't force you to migrate from an SNA to a TCP/IP backbone. Instead, it allows easy travel into an efficient internetworking future.

Much of the system's power and usability come from its unique Address Processor and Directory. This automatically seeks out and learns workstation addresses and other parameters that are vital in routing and network management.

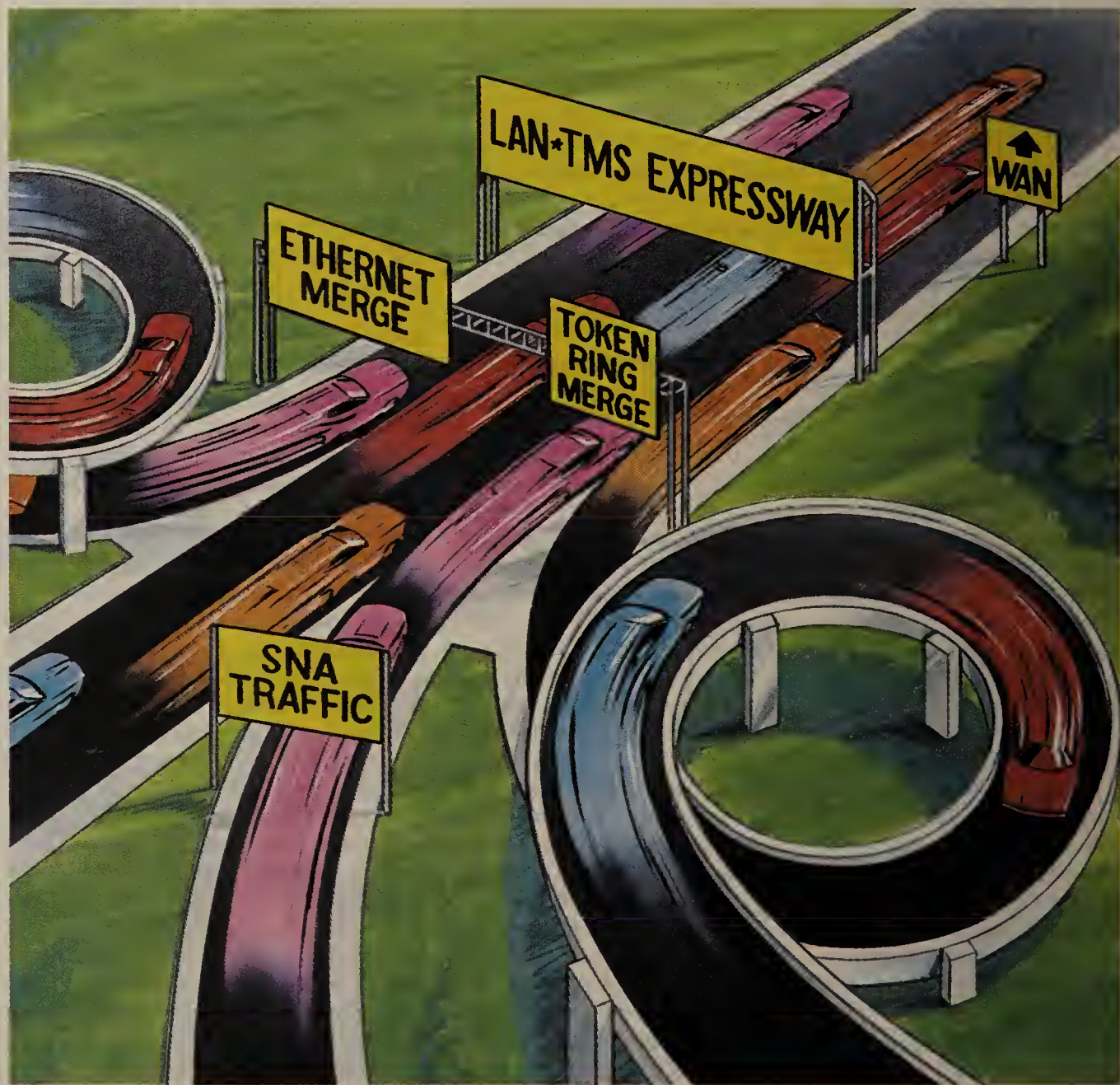
Within seconds of power-up, the LAN*TMS system determines this key information for each station in the network. When a computer is moved or added, it automatically reflects the change, eliminating endless hours of network support time.

Besides easy installation and usage, GDC's LAN*TMS offers other advanced capabilities, such as its SPF (shortest path first) link-state routing protocol.

This allows you to take full advantage of a secure mesh network configuration, routing around failed WAN links, failed LANs, or congestion. SPF prevents session timeouts and increases efficiency, selecting paths based on WAN traffic, line usage, error conditions — and priorities set by you, the network manager. LAN*TMS won't clog WAN links and waste precious bandwidth with unnecessary traffic.

LAN*TMS also provides support for IBM's LAN Network Manager, for SNMP, and for GDC's Internetworking Management System (IMS), as well as for MEGAVIEW, GDC's most advanced network management system.

And LAN*TMS is backed up by GDC's extensive worldwide sales and service capability, offering everything from on-site maintenance to disaster recovery.



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Fitting LANs into enterprise management

By DAVID RHODES

There's an old proverb that says, "It never rains, but it pours." After years of waiting for vendors to address local-area network management, users are in the midst of a product

downpour of sorts.

With LAN management standards evolving quickly and companies continuing to move applications from host-based systems to LANs, vendors are beginning to deliver the tools needed to monitor LAN conditions and take the appropriate actions to sidestep potential problems or remedy faults.

Earlier this year, Novell, Inc. announced its Network Management System (NMS) to monitor NetWare LANs across an enterprise. And IBM is on the verge of serving up its Distributed Systems Manager (DSM), an OS/2-based software platform for centrally managing departmental LANs and for linking them to enterprisewide managers such as NetView.

IBM's and Novell's product entries will contend with other net management platforms such as Hewlett-Packard Co.'s OpenView and Sun Microsystems, Inc.'s SunNet Manager, both of which offer a broader range of capabilities.

Scores of other vendors have been busy developing products that complement these management platforms, providing system- and network-level management services.

At the heart of these announcements is a common thread: Vendors are attempting to give net managers the same systems and network management capabilities at the LAN level that they have used historically with mainframes.

A key factor driving the rapid influx



The product drought is over, and a variety of methods are emerging to control distributed LANs and link them to enterprise managers.

of LAN management tools is the evolution of new net management standards as well as major enhancements to existing standards.

New proposals such as Secure Simple Network Management Protocol, Simple Management Protocol (SMP) and Enhanced Management Agent Through Extensions (EMANATE) are changing the way users and vendors think about LAN management.

These developments promise to ease control of desktop and network resources through the use of a greater number of net management protocols. The advent of LAN-based management platforms, such as Novell's NMS and IBM's DSM, will vastly simplify the application development process for users and vendors, resulting in a wider se-

lection of interoperable management tools.

This is all good news for network managers, many of whom are frustrated with the current state of LAN management.

"Users are bothered by the fact that until recently, the fastest growing segment of the network market — the desktops — has had the least amount of network management development under way," says Jamie Lewis, vice-president of information systems with The Burton Group, a Salt Lake City consultancy.

SNMP developments

SNMP has been widely adopted for managing internetworks, but vendors have launched efforts on multiple

fronts to address some of the protocol's shortcomings.

One of the biggest concerns to managers of large networks is SNMP's lack of security. While many network managers use SNMP GET commands to retrieve device information, some are wary of the commands due to the danger of unauthorized users changing critical device functions. In fact, many vendors have not implemented SET commands in their management products because of the lack of security.

In an effort to address that drawback, vendors have undertaken an effort to develop Secure SNMP, a set of security features originally devised as an adjunct to the SNMP protocol.

Although Secure SNMP is close to becoming a standard, it will not be implemented by itself as an upgrade to SNMP. Instead, it will be incorporated into the new SMP proposal recently submitted to the Internet Engineering Task Force by several independent consultants, including Jeff Case, president of SNMP Research, Inc. and one of the four authors of SMP, and Marshall Rose, a principal of Dover Beach Consulting, Inc. in Mountain View, Calif.

Secure SNMP will alleviate users' concerns by adding encryption and authentication services to SMP products.

It supports the Data Encryption Standard, which prevents hackers from reading management information, and the Message Digest Algorithm 5, which places an authenticity stamp on packets to ensure that they can't be altered by unauthorized users. Such enhancements

should help vendors gain added control over their products, bringing more of a mainframe-like security to LANs.

At Westinghouse Hanford Co., a contractor for the Department of Energy (DOE), security is an important issue. "Although only about 50% of our network devices are SNMP-compliant, any new device on our internet must be," says Justin Blackmore, a LAN technology analyst at the firm. "Because we are a DOE site, we're looking seriously

(continued on page 68)

The majority of network administrators say their companies lack an overall strategy for managing LANs.

User wish list:

- Remote LAN management
- Integrated management applications
- Real-time/historical monitoring at concentrator, module and port levels

- Increased automation of routine administrative LAN tasks

Shipments of integrated LAN management stations will increase about 41% annually over the next 5 years.



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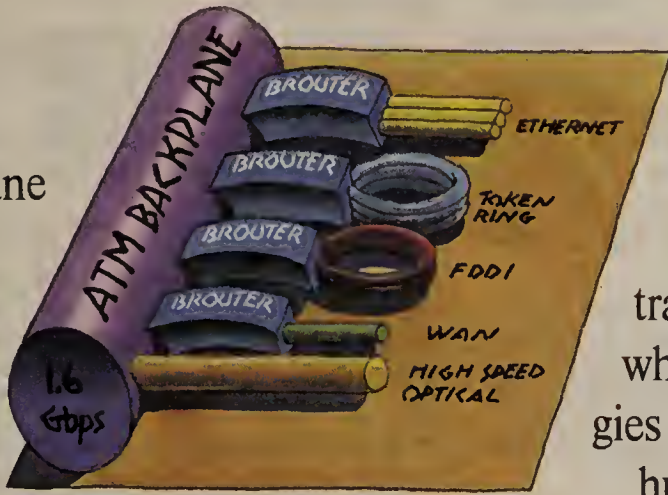
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Getting more performance from less hardware is the idea. With over 2 Gbps of bandwidth, the Enterprise Hub makes the idea reality.

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hubs. Instead, the Enterprise Hub's segmented backplane lets you integrate and internetwork multiple Ethernet, Token Ring and FDDI LANs all within the same hub.



The Enterprise Hub's ATM Backplane architecture allows incremental expansion of your network to utilize over 2 Gbps of bandwidth.

future networks that combine voice, video and data traffic. And when technologies like gigabit hub-to-hub links and ATM interfaces are ready, your hub's ready for them.

MORE INTELLIGENT MANAGEMENT.

There's nothing too smart about expanding your network to the point where it grows beyond your control. Here again, the Enterprise Hub is the intelligent choice.

Dedicated SNMP processors reside on every module in the hub. So you always have easy access to the information you need. And every time you add a module, you also add network management processing power.

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Network managers tell us they need absolute system reliability. You'll get no argument from Hughes. Instead what you'll get are system safeguards like redundant load-sharing power supplies. Hot-swappable

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In the future, as complex applications demand greater bandwidth, the Enterprise Hub gives network managers the flexible architecture they need to make migration simple.

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Segmented hubs have become the network's highway system. So integrating bridges and routers within the hub makes perfect sense. However, that can result in the type of backplane traffic that resembles rush hour in L.A.

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(continued from page 65)
into Secure SNMP."

That would mean the adoption of products that support SMP, which has substantial benefits. The protocol allows bulk transfer of management information, supports event-driven manage-

remedy another one of SNMP's biggest problems — poor traffic support.

"SNMP doesn't do as well with large numbers of devices," says Woods. "Lots of traffic is generated when management stations and agents can only share one

With EMANATE, components such as disk drives and network cards enroll their Management Information Bases (MIB) with the master agent during start-up and more dynamic components such as applications could enroll and de-enroll their MIBs as needed.

The standard will use SMP or SNMP as the protocol to communicate with a management console. "EMANATE is not a part of SMP, but SMP is a part of EMANATE," Case says.

Transparent APIs

Addressing some of the same issues as EMANATE, but in a much broader scope, is the Desktop Management Task Force (DMTF). Companies such as Digital Equipment Corp., HP, IBM, Intel Corp., Microsoft Corp., Novell, SynOptics Communications, Inc. and Sun's SunConnect division have gotten together to standardize management information at the desktop to allow various desktop components and software to be managed by any management platform over any management protocol (see Figure 2, this page).

The vendors are defining a string of common application program interfaces (API) that will serve as an interface layer between a master agent and workstation hardware components, applications and operating systems. The master agent is then capable of relaying data to a management station via SNMP or CMIP over Logical Link Control, a stripped-down version of CMIP.

The APIs for this middle layer

agement platform.

According to The Burton Group's Lewis, the DMI has a lot of potential. "Users need a standard way to manage both DOS and Windows workstations," he says.

While the technical details of the APIs are not yet known, Lewis suspects the task force will probably implement the APIs as a terminate and stay resident (TSR) program or into the network shell, but "the cleanest way to do it would be to integrate it into the desktop operating system itself."

The formation of the task force and its goals have been generally well received by the vendor community. "We welcome the development of standards that grant easier access to relevant node information," says Mark Dixon, president and chief executive officer of Fresh Technology Co., maker of NodeVision, a Windows-based LAN management tool. "Any development that helps us get important information to the network manager is a good one."

Microcom's Woods says one of the major benefits of these standards is that "the people who build the components of a workstation can now be responsible for developing the agents to manage them." Such developments would help the network manager in mixing and matching the best desktop components without having to worry about proprietary management techniques.

3Com Corp. plans to become very involved in the DMTF. Although not a primary member, the company will be sponsored by

sulted in the emergence of three classes of products for managing LANs.

One class is oriented toward managing the components of individual nodes on the network with little direct integration into SNMP-based management offerings. These products offer configuration and change management capabilities for network nodes. A second class of LAN management tools is oriented toward end-node management; these products use proprietary manage-

“EMANATE is not a part of SMP, but SMP is a part of EMANATE.”



ment, comes with increased support for popular transport protocols and includes Secure SNMP.

Bulk transfer overcomes SNMP's limitation of asking downstream agents for only one piece of management information at a time, a process that can congest the net with management data. SMP's event-driven design allows devices to signal the management console when a certain event occurs, rather than

piece of information at a time. The bulk transfer of SMP will help solve this problem by passing more than one key piece at a time."

SMP also provides support for network protocols and IP to be used between devices and management consoles. These include AppleTalk, Novell's Internetwork Packet Exchange (IPX) and Open Systems Interconnection protocols.

SMP is moving rapidly toward becoming a standard. "The working group responsible for moving SMP from a proposal to a standard is currently being chartered," Case says.

He hopes the standard will be completed in November. However, some major vendors have already thrown their support behind the effort.

"We are not upgrading our network management products to include just Secure SNMP," says Jeff Turner, product-line manager for Novell's Network Management Products Division. "Because of the other added benefits, we're moving directly to SMP." Such a migration, not only by Novell but also by other vendors, should have a minimal impact on users since SNMP and SMP are compatible.

Managing the desktop

Another major development in the SNMP arena is the EMANATE standard, which Case and others are driving, as well.

EMANATE allows multiple components in a device to be managed through a single master agent (see Figure 1, this page). In effect, an agent of agents on remote nodes collects data from other agents and passes it to the SNMP management console.

“We are not upgrading our products to include just Secure SNMP.”



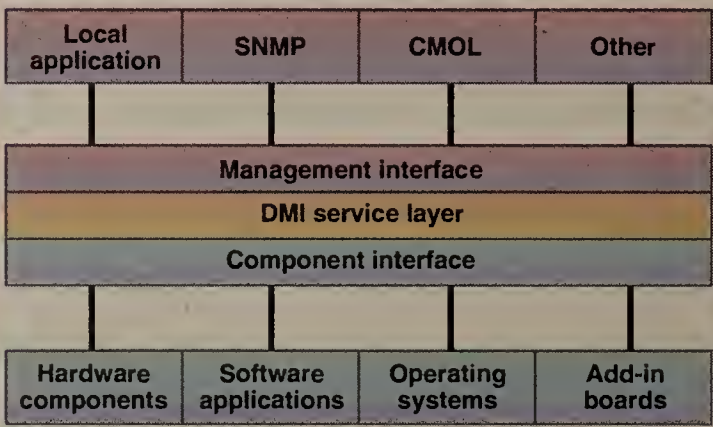
being constantly polled by the console. This represents a philosophical difference with SNMP, which requires the management console to constantly poll remote agents.

SMP's benefit is that the event-driven design reduces net management traffic since a remote agent only signals the management console when it has something to report. This is the same premise behind the Common Management Information Protocol (CMIP).

Emerick Woods, vice-president and general manager of Microcom, Inc.'s Client Server Technologies Group, believes the additional security provided within SMP is important as networks grow, but SMP will also

Managing desktop devices

Figure 2



Desktop Management Interface (DMI) provides a set of application program interfaces to workstation components and management agents.

GRAPHIC BY SUSAN SLATER

will include management and component interfaces and will be called the Desktop Management Interface (DMI). By writing applications to the DMI, component vendors' products can be managed by any major management station. Likewise, such an approach reduces the labor for developers, which simply write their application once instead of for each vendor's specific man-

one of the eight founding members of the task force. "We intend to be a participating member, helping to define specs for the network interface portions," says Clay Bullwinkle, product manager for 3Com's LinkWatch network management product.

Class distinctions

This evolution of network management standards has re-

Another differentiating factor between LAN management platforms and integrated managers such as OpenView and SunNet Manager are that the LAN managers run solely on personal computer-based devices, while OpenView and SunNet Manager run on larger machines. This gives those two platforms the ability to handle element management systems in order to gain a perspective of the entire enterprise network, not just LAN activity.

LAN management platforms are capable of managing an entire organization's distributed LANs from a central site. The products can also be deployed on a regional basis to form a more distributed LAN management approach.

The most important developments at this level have come from Novell in the form of its NMS. It is designed to provide a

(continued on page 72)

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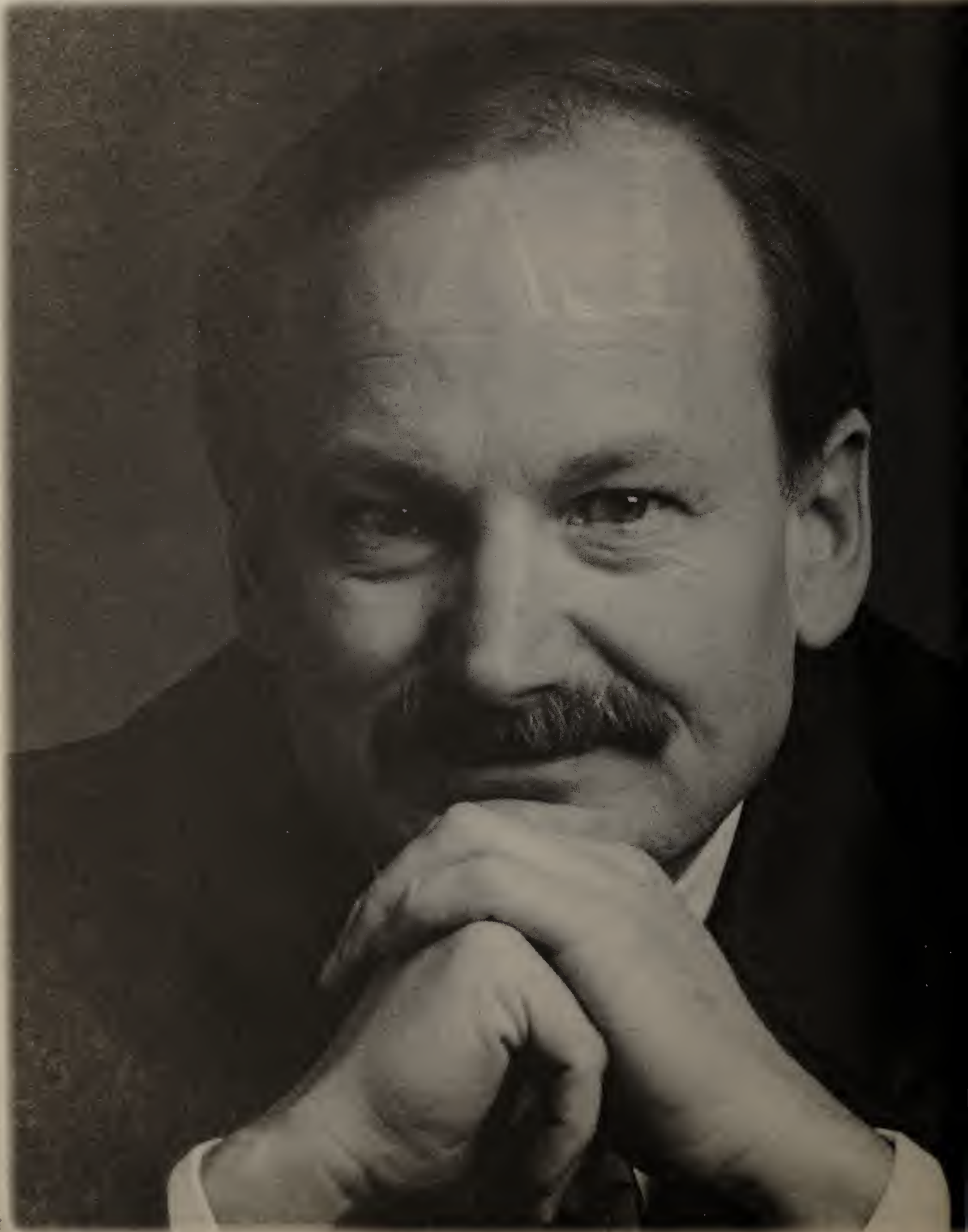
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(continued from page 68)
open, object-oriented environment for developers and a powerful, simple interface for users to manage NetWare as well as other network devices.

Despite NMS' promise, Novell has received negative feedback from users and application developers alike. Developers have complained that software development kits are late. Novell's Turner estimates only 50 to 100

and the NetWare Management Enhanced Map. The Enhanced Map provides locational mapping — or the ability to load a bit-mapped schematic of a building into the system — enhanced autodiscovery of devices and full SNMP support in Transmission Control Protocol/Internet Protocol environments. This allows managers to place the icons of discovered devices on IPX or IP networks in their correct physical

Open Management Protocol] API, management information can be relayed through SNMP or CMIP."

IBM intends to be able to fully manage NetWare servers through the DSM platform, but neither Rosen nor Turner would comment on exactly how that would be accomplished. However, sources close to Novell say it will license its OS/2-based NSM console to IBM for use as the DSM's user interface.

Novell will continue to develop both the OS/2 and Windows system agents for NetWare servers, but IBM will market the OS/2-based NSM since most OS/2-based LANs are in IBM shops, sources say.

The announcement is also expected to appease developers of Windows-based NSM applications since very few have the resources to develop for both consoles.

At a slightly higher level of functionality and power is NetView/6000. Running on a RISC System/6000, this LAN management platform promises multiple management protocol support through the XMP API. According to Rosen, the choice of the hardware and operating system platform — Intel and OS/2 or Reduced Instruction Set Computing and AIX — is up to the user.

"We intend to have coequal management platforms with DSM and NetView/6000," he says.

Real innovators

LAN management platforms

themselves do not make a full-fledged LAN management system. While some vendors provide system- and net-level applications as options to their LAN management platforms, third parties are the real innovators.

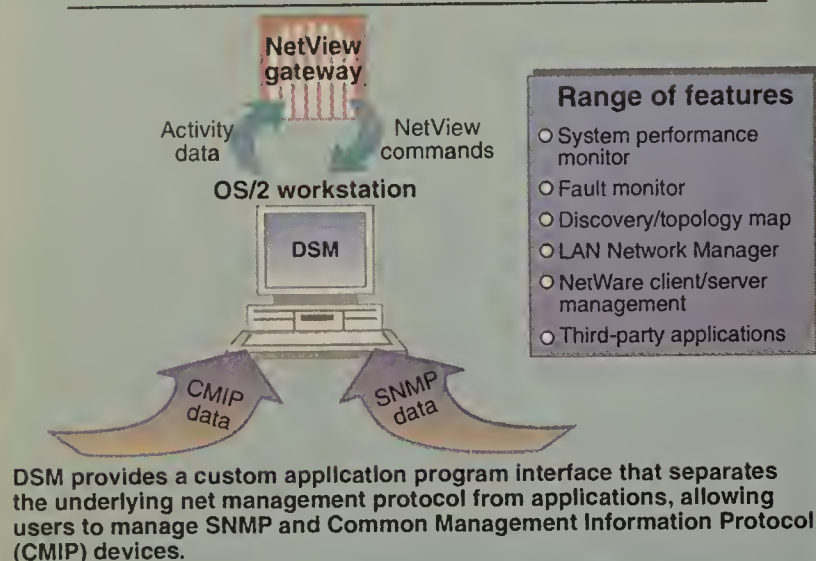
Net management application

connection management, TCP/IP address management and uninterruptible power supply monitoring.

How does such a design compare to a standards-based design such as SNMP? "While SNMP mainly focuses on fault identi-

IBM's Distributed Systems Manager

Figure 3



GRAPHIC BY SUSAN SLATER

developers' kits have shipped and "we're talking to almost a hundred more who are interested."

Furthermore, users and developers are confused about Novell's Windows and OS/2 implementations of NMS.

Early NMS users have taken issue with the NetWare Services Manager (NSM) portion of NMS that is the user interface to the system. Novell offers a Windows and OS/2 version of the product; however, each utilizes different APIs to communicate with NetWare servers.

The OS/2 platform is based on an internal Novell standard called MSAPI, while the Windows version uses a version of SNMP that runs over IPX. Developers can choose to write to MSAPI for OS/2 or to SNMP for Windows, but the MSAPI for Windows is not open to developers yet.

Turner says the two systems are as different as the Windows and OS/2 APIs themselves. "We'll wait and let the market tell us if the enhancements we've made to the Windows products should be carried over to OS/2," he says. This has put tremendous pressure on third-party developers to write different versions of their applications for each NSM version.

The Burton Group's Lewis says NMS really stands for "in a mess," adding that he doesn't believe developer support will take off until Novell makes these two platforms consistent.

NMS was originally designed as two separate products — a base-level product called NSM 1.0

locations according to the bit-mapped blueprint or diagram scanned into the system.

Novell has recently repositioned the Enhanced Map so users of NSM 1.0 will receive the Enhanced Map free of charge.

Oregon State University's College of Business currently uses NSM 1.0 to manage eight NetWare 3.11 servers, 250 workstations and a number of Ethernet-attached laser printers (see "Giving NMS the old college try," this page).

"It's a good base to begin with but is not the definitive product," says Anil Srivastava, a product testing engineer for the college. "It's not mature, but it holds a lot of promise. Good third-party applications will be the key to its success."

Enter IBM

Another area to watch with regard to LAN management platforms is IBM's pending DSM, software designed to run on an OS/2 workstation and provide centralized management of distributed LANs.

Slated for introduction early this month, the DSM promises truly distributed management of platforms from the PC to the mainframe through interaction with NetView and NetView/6000 (see Figure 3, this page).

"DSM will be a multimanagement protocol platform," says Al Rosen, program manager for systems management at IBM's Research Triangle Park facilities in North Carolina. "Through the X/Open [Company, Ltd.'s X/

Giving NMS the old college try

One beta user of Novell, Inc.'s Network Management System (NMS) says the software is fairly stable but adds that Novell has a few rough spots to work out.

Network managers at Oregon State University's (OSU) College of Business like NMS because it is proactive in identifying and resolving local-area network problems, as opposed to just reacting to net conditions.

"If we can know ahead of time that a [NetWare disk] volume is running out of space or that the number of collisions on a LAN segment is exceeding a certain threshold, we can take action to fix the problem before we have frustrated users ringing our phones," says Greg Scott, computing services manager at the college.

OSU's business school network comprises two NetWare LANs: a faculty net with eight NetWare 3.11 servers and a student network with four of the same servers. Connected to each

other via an internal NetWare router, they are linked to the rest of the campus using Novell's Transmission Control Protocol/Internet Protocol software.

More than 250 nodes at the college are served by the NetWare LANs, as are 25 to 30 Ethernet-connected Hewlett-Packard Co. LaserJet IIIsi printers.

The school's net managers view the networks as more than simple repositories for applications.

"We run our network as a communications and information resource for faculty and students," Scott says. "We need to keep on top of not only our servers, printers and workstations, but our links to the campus and the outside world, as well."

The college has been using NMS Version 1.0 since its beta release almost a year ago, and it is testing the second release with NetWare Management Enhanced Map capabilities.

"We like the autodiscovery process, but the map needs a lit-

tle work," he says.

The autodiscovery process, which Scott says has been significantly improved in the forthcoming release, finds all Novell Internetwork Packet Exchange (IPX) devices and displays them in icon form based on function, such as server, router or workstation. It then attempts to draw a locational map of the devices. "[But] in a large network, we've had trouble with it getting a bit confused in drawing redundant links," Scott says.

Although Scott believes third-party applications will play an important part in the NMS' success, OSU's College of Business itself doesn't need a lot of bells and whistles. "Inventory and configuration management of workstations can be important," he says. "In our case, however, we just have myself and two or three others to support the whole network. Therefore, we've totally standardized all hardware, software, configuration files and network shells."

— David Rhodes

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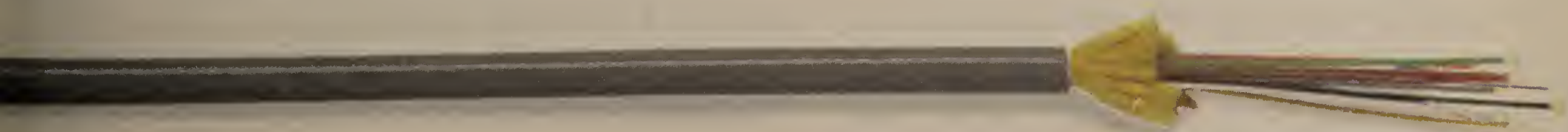
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GUIDE TO STRATEGIC PURCHASE DECISIONS



LAN OPERATING SYSTEMS

Meeting the NOS selection challenge

By ROBERT JANUSAITIS

There is a fundamental shift in computing strategies sweeping the industry today, and local-area network technology is at the root of it. A growing number of firms are favoring distributed processing across interconnected LANs over the centralized terminal-to-host computing architecture that has been in vogue for decades.

Users face many challenges in successfully effecting this shift, the greatest of which is the selection of a network operating system (NOS). The NOS forms the primary building block for LANs and determines how flexible the network will be in supporting applications that increase efficiency, enhance customer support and boost profits.

Additionally, selecting a NOS creates a road map users must follow when making such vital decisions as settling on server and client hardware and choosing add-on software products such as management tools.

There are several critical factors to consider when selecting a NOS, chief among them is performance. While many aspects of performance must be considered, the overriding issue is to pick a NOS and LAN design that keeps end users happy.

If performance lags, users will become frustrated with latency when exchanging files with the server or waiting for the server to complete application processing tasks. These users may even opt to continue to rely on personal computer-attached printers, stand-alone applications and hard disks instead of tapping network resources.

For companies that require

near 100% LAN uptime, fault tolerance features that provide disk and server backup are an important issue when buying a NOS. Likewise, firms that must protect the network from unauthorized users will place an emphasis on security features.

Every company will want to know about NOS memory requirements at the server and workstation levels. NOSes requiring large amounts of memory dictate the use of higher priced servers and workstations. Firms will also want to know if there are widely available utilities made by the NOS vendor or third parties and whether there is a large pool of trained personnel capable of managing and maintaining the NOS. Lastly, enterprise connectivity options that enable users to interconnect multiple LANs is also a big issue in NOS selection.

While there are many NOS products on the market, only a few offer the type of full functionality large users want. Of those products, the four most prominent are Novell, Inc.'s NetWare Version 3.11, Banyan Systems, Inc.'s VINES Version 5.0, Microsoft Corp.'s LAN Manager Version 2.1 and Apple Computer, Inc.'s AppleShare 3.0.

Each of these products was architected to meet the needs of different types of users. Today, Net-

Ware is best suited for small to large single-site LANs ranging in size from 20 to more than 250 users that require high levels of

The tough task of picking a network operating system can be made easy by examining their basic architectures.

fault tolerance and quick server-to-workstation communications. VINES is more suited to companies looking to link widely dispersed LANs into a large internetwork with its top-notch global naming service and server-to-server communications facilities. Novell is attempting to challenge

this Banyan advantage by building better enterprise connectivity features into NetWare 4.0, its next-generation product.

LAN Manager is best suited for medium to large work groups of between 25 and 200 users. While it offers high performance between servers and workstations, LAN Manager does not match NetWare's performance. Likewise, while LAN Manager provides strong global naming facilities, it cannot yet match what Banyan offers in this area.

AppleShare is squarely designed for small work groups of Apple Macintoshes connected via AppleTalk. It offers acceptable performance and can be used to link Macintosh networks at various sites. But the more telling reason for using AppleShare is that AppleTalk connectors come bundled with the purchase of each Macintosh, meaning users only have to buy the NOS and cabling to set up an AppleTalk net.

Performance issues

Perhaps the most critical and readily noticeable of this criteria is performance. How your LAN performs will ultimately affect how your business performs.

Users should examine several different aspects of performance including the NOS' operating speed and the number of users it can support before performance starts to degrade. Other factors include what type of applications the NOS is best suited for and how the NOS fits into the LAN topology.

The fastest NOS in the world does no good if it's used to support an application that is geared toward batch processing where speed is not a major issue. Like-

(continued on page 80)

A Guide to Strategic Purchase Decision (GSPD) provides in-depth information concerning key technology buying decisions facing network executives. A GSPD is designed to help users make a strategic buying decision that will influence the application and net man-

agement choices they will make in the future as they shape their enterprise networks.

This GSPD explores the ins and outs of the four leading local-area network operating systems that, in large measure, define the type of net architecture a user will implement.



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(continued from page 77)

wise, having a fast NOS won't help performance if the transmission capacity between servers and workstations is limited.

Rarely does a properly designed, installed and maintained network experience performance problems. Let one element be off, however, and end users will be the first to notice, especially if it takes a significant amount of time to transfer files between the server and workstation. Gone unchecked, performance limitations could become a major stumbling block in end-user acceptance and use of the LAN.

While there are many variables in measuring true performance, the most common benchmark is how quickly the server can process file requests. NetWare has the edge in this area, a fact that has been borne out in many tests.

NetWare was designed from the ground up to quickly handle requests for relatively small files. LAN Manager does a bit better when file sizes are large. VINES' performance remains relatively consistent across file sizes and typically falls somewhere in between NetWare and VINES ("Test shows which NOS performs best for you," *NW*, Jan. 20).

Other elements affecting performance are the NOS server platform and the computer operating system the NOS uses. With the exception of Apple, each vendor recommends the use of servers with at least an Intel Corp. 80386 processor to attain acceptable performance. AppleShare runs on Macintoshes, which utilize Motorola, Inc. processors. Obviously, the larger the processor, the faster the NOS will be able to operate.

Likewise, the operating system a NOS uses will dictate some measure of performance. NetWare acts as its own operating system on servers that have been booted using DOS. This means NetWare replaces DOS as the server operating system once boot operations are completed.

NetWare offers a few performance advantages over DOS. For instance, it handles file operations using 4K-byte chunks of data instead of the 512-byte chunks DOS uses. It also has a caching mechanism that stores megabytes of frequently used data in memory, allowing quicker access time than if the data were stored on disk.

VINES was designed to run on top of Unix, while LAN Manager was designed to run on top of OS/2. Both Unix and OS/2 operate faster than DOS and support multitasking.

By supporting Unix, VINES is also able to run on more powerful server platforms, including minicomputers with speedy processors. Not to be outdone, Novell has released versions of NetWare that run on various flavors of Unix.

Reliability concerns

While performance may be the most immediately noticeable element of a NOS, fault tolerance — in which the NOS can switch to a backup LAN component when the primary one fails — is just as important. For most companies, this feature is a life or death issue. If the LAN fails, it can result in lost revenue or, worse yet, put a company out of business.

Basic fault-tolerant features include disk mirroring, which enables users to store the same data on two identical hard disks that are connected to the same file

server. Data on both disks is simultaneously updated, enabling one to carry on with the freshest data should the other fail.

A step beyond disk mirroring is disk duplexing, which involves the use of two disk controllers, each of which can support a series of disks. The same data is stored on disks attached to either controller, enabling work to continue should one controller fail.

There is a trend toward extending the duplexing concept to servers. To achieve server duplexing, identical servers are connected over a high-speed channel that

typically operates at 100M bit/sec. The NOS monitors server activity and updates each server accordingly. If a network interface board or power supply failure brings one server down, the other server can carry on processing.

Another important fault-tolerant feature is uninterruptible power supply monitoring, which sends clients a warning message in the event of an electrical failure and automatically shuts down the file server.

NetWare and LAN Manager come bundled with a number of fault-tolerant fea-

tures, while VINES and AppleShare rely on third-party add-on products to support fault tolerance.

Novell's current top-of-the-line version of NetWare, Version 3.11, has the most extensive and easy-to-use fault-tolerant functionality, including disk mirroring, disk duplexing and uninterruptible power supply monitoring. NetWare 4.0, the next-generation product set for commercial release soon, will provide server duplexing on a wide-scale basis. Novell currently provides server duplexing as an extra-cost option to NetWare 3.11 on a limited basis to

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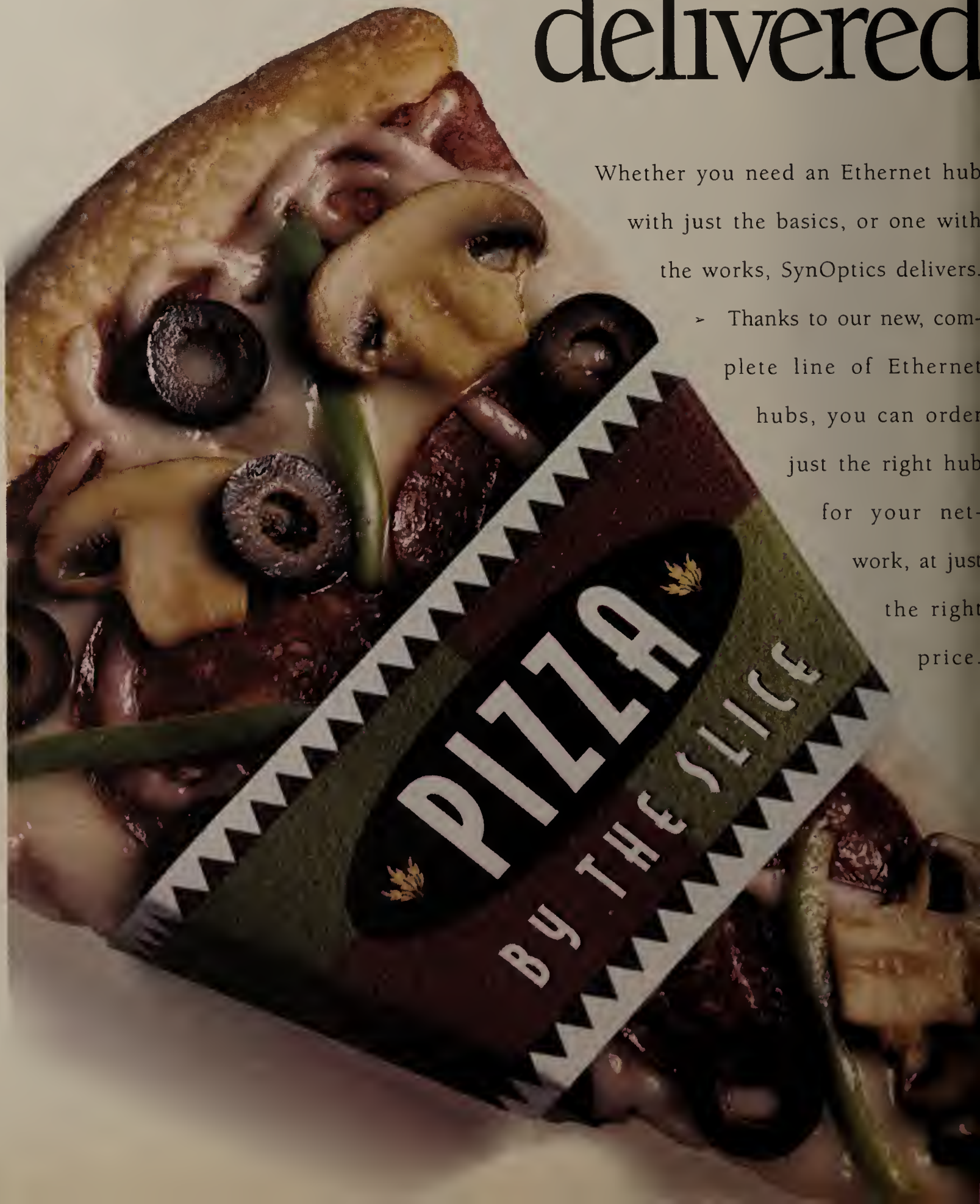
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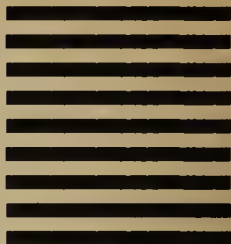
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LAN Manager has many of the same extensive fault-tolerant features as NetWare, but they are not as easy to use. LAN Manager administrators will spend more time initializing fault-tolerant features than NetWare administrators.

VINES users can attain high levels of fault tolerance with the proper choice of server hardware. For instance, users interested in server or disk duplexing may want to run VINES on Compaq Computer Corp.'s line of fault-tolerant servers.

AppleShare users can also attain fault

tolerance by using fault-tolerant hardware and software add-ons.

Each NOS offers varying levels of support for detecting and correcting errors in the server's random-access memory. These features flag and often repair RAM problems while the NOS is operating.

A question of security

Performance and fault tolerance may be the major factors to consider when choosing a NOS, but security cannot be overlooked. Indeed, the increased acceptance of distributed processing has more

and more companies turning to LANs in order to support mission-critical applications, and they must make sure those applications are secured.

Each NOS vendor recognizes this fact and provides comparable levels of security, but users don't seem to be aware of them. Even though applications must be secured, the most common LAN implementations only use basic security features, such as setting up user identifications and passwords — a truly frightening reality.

Few users tap the broader security fea-

tures available in NOSes. One such feature is account locks, which instruct the server to stop accepting logon attempts from a particular client after a specified number of password failures. Another is access privileges, which can be used to prevent unauthorized users from accessing entire file directories on a server, other LAN devices or specific files on certain servers.

In the future, NOS security features will include protection against viruses, which generally infect only workstations. A NOS that can monitor the network for viruses is extremely important because it enables LAN administrators that have control over each workstation to protect them all.

Even though each NOS offers comparable levels of security, there are slight differences in how each vendor offers security. NetWare has initial system security that includes logon and password features, directory-level security and file-level security. Although NetWare is not shipped with audit trail capability, there is a NetWare Loadable Module (NLM) to provide additional system access monitoring. NetWare also encrypts passwords, which prevents individuals from tapping into the LAN cable with a LAN monitor and stealing passwords.

There are also several NLMs that help reduce virus risks. Some virus protection vendors are now beginning to address viruses for OS/2 and Unix-based systems, such as those utilized by LAN Manager and VINES.

VINES takes NetWare's password encryption feature one step further by encrypting the data being transferred between the server and the workstation in addition to the password. This way, hackers tapping into the LAN cable with a LAN monitor cannot steal such data as customer account information that passes between the server and workstation.

LAN Manager taps the security functions built into OS/2, including a limited audit trail capability. LAN Manager also allows administrators to create security domains and assign the same set of privileges to each user in the domain.

AppleShare is implemented with a default setting that prevents Macintoshes added to an existing LAN from accessing resources until the administrator creates a user account. It also has a copy-protection setting that prevents users from copying secured documents from a server. Other features include folder locking, which prevents users from accessing files stored in a specific Macintosh folder; a concurrent application launch feature that limits the number of active applications a user can display on the Macintosh; and an administrator logoff feature that enables an administrator to log off unauthorized users.

How much memory?

Another important factor to consider is the amount of RAM required to run the NOS on the server and the client. Typically, servers equipped with 12M to 16M bytes of RAM will run any of the NOSes well.

The amount of RAM the NOS requires on the client is another story. Each vendor requires varying amounts. NetWare and LAN Manager require 640K bytes of RAM, while VINES requires 112K bytes, and AppleShare requires 100K bytes.

These RAM requirements often dictate
(continued on page 94)

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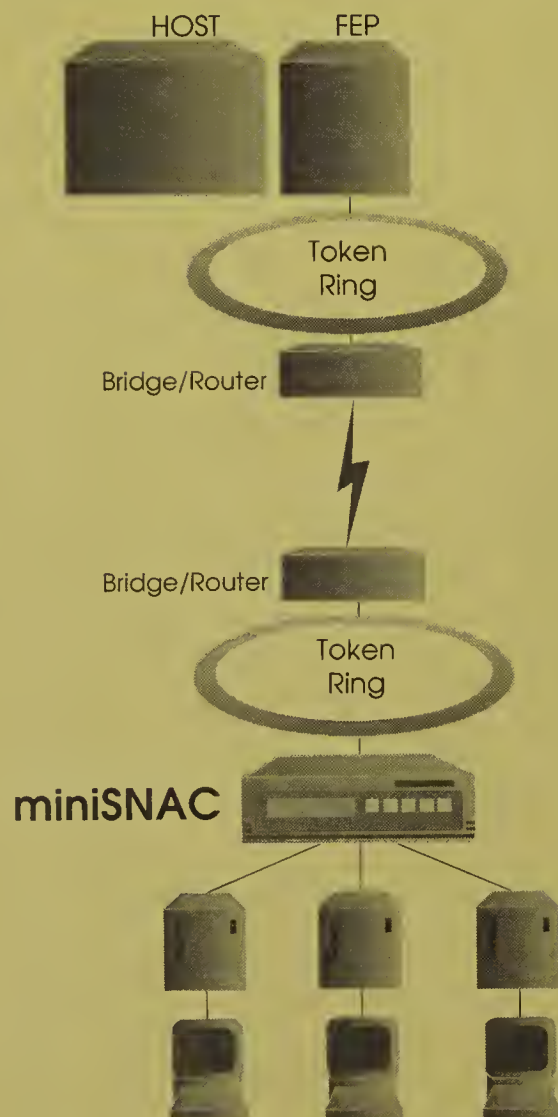
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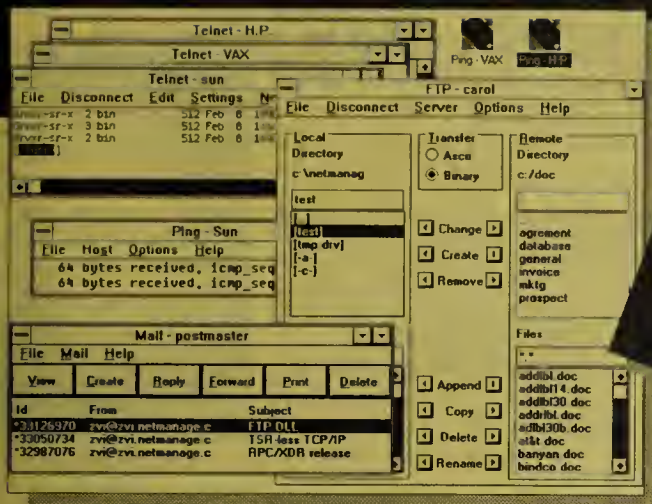
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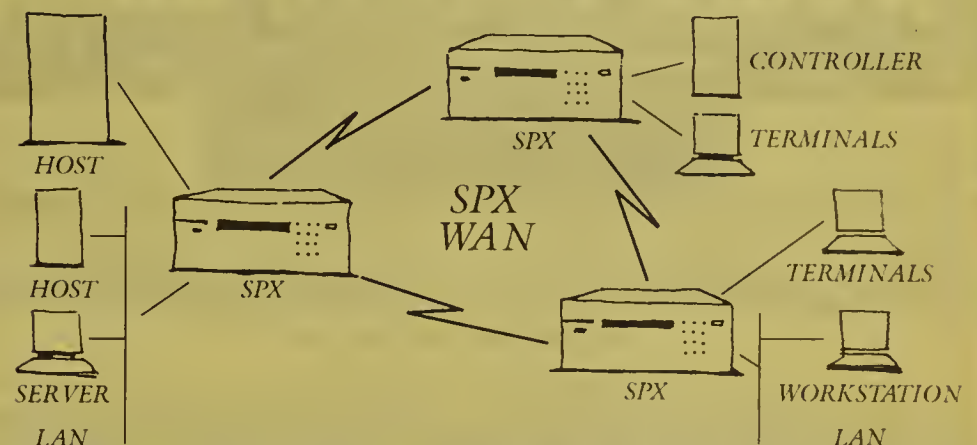
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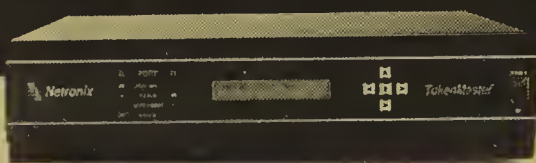
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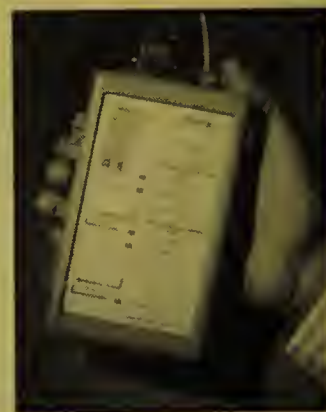
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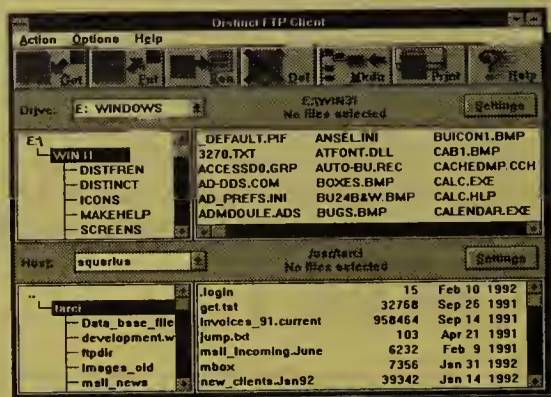
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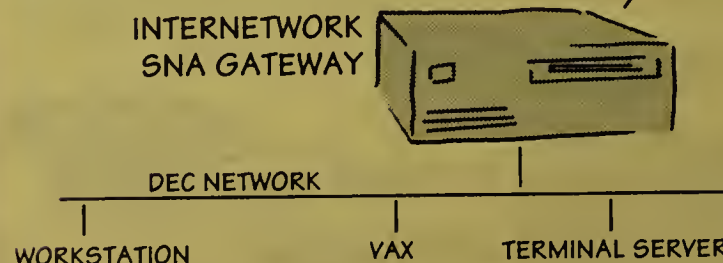
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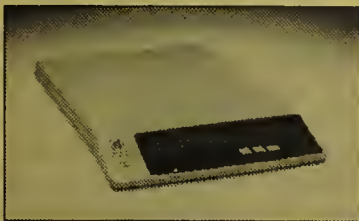
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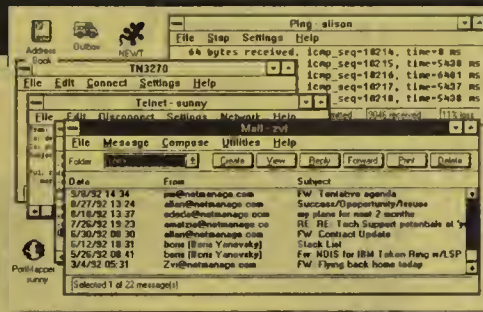


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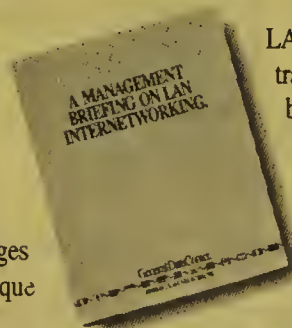
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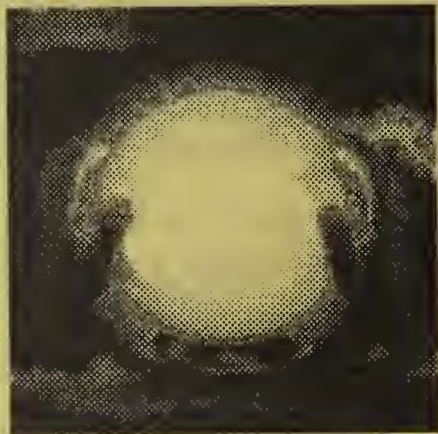
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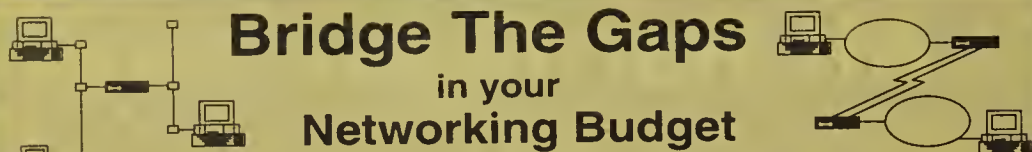
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For More Information, Call:

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LAN/WAN INTERNETWORKING



Bridge The Gaps in your Networking Budget

Ethernet

Local starting @ \$1,695
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- Media conversion 10Base5/2/T
- WAN links to 512 Kbps —or to T1 speed.
- Single, or Dual Link MULTI-point/Loadsharing.
- Bandwidth-On-Demand WAN Optimization.
- Powerful filtering capabilities.
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- 100% IBM® source-routing protocol compatible.
- 4 & 16 Mbps with conversion.
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We're Making a Lot of Important Connections



Introducing ...

... **The
Micro-Matrix™
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An economical, entry-level matrix switching system, the Micro-Matrix is ideal for small or distributed network sites. Modular design permits system configurations from 2 to 96 ports.

The Micro-Matrix features 4-wire circuit switching and the industry's highest

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**TELENEX
CORPORATION**
A UNIT OF GENERAL SIGNAL

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ConnectT-1 PLUS. FEATURES INCLUDE:

- ☐ Access to T1, fractional T1 and virtual private networks
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- ☐ Verinet 2 integrated remote management for ConnectT1 Plus and all Verilink ESF CSUs
- ☐ Verilink Value

WE'RE SO SURE YOU'LL BE SATISFIED, WE'RE BACKING IT WITH THIS FABULOUS OFFER. SO TURN IN THE OLD AND GET THE NEW, CALL NOW WHILE THE SAVINGS LAST.

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Half the cost of other repeaters - only \$499!



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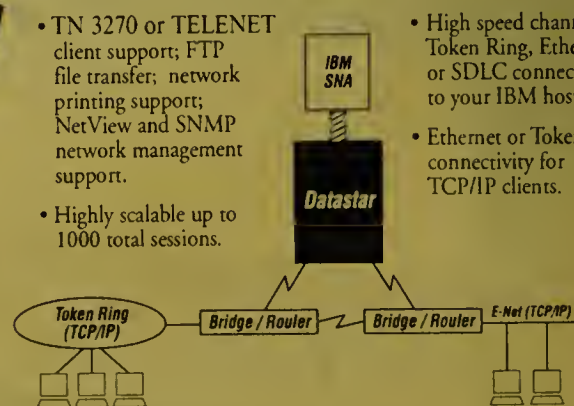
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MULTI-PROTOCOL GATEWAYS

An "All-Together Better" Networking Solution

At Apertus, we recognize the growing demands you face to provide your TCP/IP-based users access to IBM mainframe resources. At the same time, we understand the expense, high CPU cycle requirements and administrative complexity of mainframe software solutions. That's why we've engineered the Datastar to give you a high performance, total system solution for accessing your IBM, SNA, and Bismac host resources from TCP/IP networks without the addition of expensive host software. Key features of the Datastar include:

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SNMP Management

Packed with features, and only \$495, **SNMPc™** is the smart choice for Windows™ Network Management.



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- Generic Hub Display
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Circle Reader Service No. 25

NETWORK MANAGEMENT CHIP SETS

SNMP & NetView

• Two most popular standards are now available in Chip-Sets.

• Network management may now be built into any Modem, T1-CSU, DSU/CSU or MUX as easily as into a Bridge or Router.

• Cost effective and highly integrated, NetQuest OEM Chip-Sets reduce product development time.

NetQuest

Mt. Laurel, New Jersey
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PROTOCOL ANALYZER

Attention LAN Internetwork Testers!

The 9470 Protocol Analyzer now supports SMDS and Frame Relay for complete high performance testing.

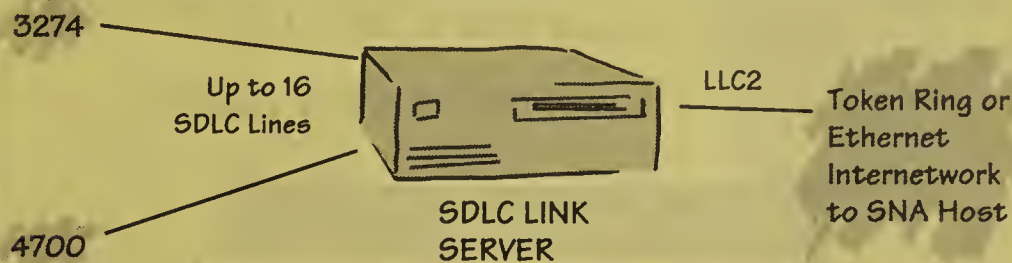
- Monitor and decode SMDS data streams.
- Provides complete decodes for all 3 layers of SMDS protocol.
- Simultaneously lets you set multiple filters to isolate data.
- Frame Relay emulation, performance and congestion analysis.

- ANSI, CCITT, vendor LMI, and PVC management standards are all supported.
- Greatly simplifies network design and optimization.
- Also supports T1, E1 (CEPT), BERT, ISDN, SS7, X.25, SNA, BSC and ASYNC testing.

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Circle Reader Service No. 27

Navtel

Netlink's SDLC Link Server.™ Now, An Even Better Way For SNA.



- Connect SDLC devices to token ring or ethernet LANs.
- Convert SDLC data to LLC2.
- Transport SNA across your internetwork.
- Merge parallel networks; reduce costs.
- Improve network performance.
- Manage via IBM's NetView® or our new In/View™ program.

Call 1-800-NETLINK!

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INC.

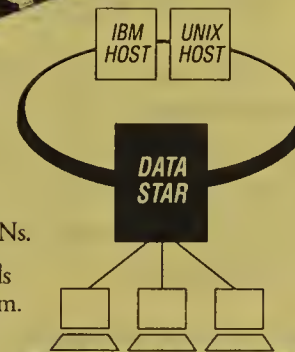
Circle Reader Service No. 28

SYNCHRONOUS TERMINAL SERVERS

Adapt Your 3270 Equipment To New LAN/WAN Networks.

Let Datastar provide your synchronous terminal users with all the performance of high-speed LAN connections without giving up functionality. The Datastar is able to integrate a large number of 3270 terminals into LAN/WAN topologies, providing users access to both IBM and Unix host resources in both Ethernet and Token Ring environments.

- Support for both SNA and TCP/IP protocols in Token Ring or Ethernet LANs.
- Connect up to 400 terminals (3270 and ASCII) per system.



- IBM system printing supported on either serial or coax-attached printers.
- Comprehensive system management including NetView, SNMP, on-line configuration support, and "hot swappable" modules.

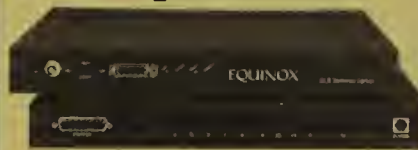
For more information on migrating your 3270 terminal investment to LAN/WAN technologies, call **1-800-328-3998, ext. 10.**

Circle Reader Service No. 29

APERTUS

TERMINAL SERVERS

Save on modem, printer and terminal connections with Equinox 8 & 16 port Ethernet terminal servers



Don't compromise performance or features for DEC and UNIX connectivity! ELS-8 and ELS-16 dual protocol terminal servers deliver blazing performance at the lowest cost per seat. Our custom RISC processors drive all terminals at top speed without degradation.

From Equinox — the async connectivity experts.

ELS-8 & 16 Standard Features:

- ☐ TCP/IP support includes Telnet, rlogin, DNS
- ☐ Full DEC LAT, DECserver compatibility
- ☐ Built-in high speed parallel printer port
- ☐ Flash ROM simplifies up-upgrades, facilitates quick recovery from power outages
- ☐ Switchable thick & thin Ethernet
- ☐ Full modem control support on all ports
- ☐ Drives all ports @ 38.4 Kbps simultaneously
- ☐ 3-year warranty
- ☐ Low price (including software) ELS-8 (8 serial ports plus 1 parallel port): \$1895
ELS-16 (16 serial ports plus 1 parallel port): \$2395

EQUINOX
800/275-3500

Circle Reader Service No. 30

**HOTTEST
NEWS
on the
TOKEN RING
market**

**RAD'S got RED-HOT Products
for 4 and 16 Mbps Token Ring!
An extensive range where
you'll find EXACTLY
what you need!**

Widest variety of:

- ACCESS UNITS
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TOKEN RING ADAPTORS

3274 + RA1200 = 3174



RA1200
\$2,450



3174
\$13,000

- Dedicated hardware that uses the IBM Token Ring chipset.
- Remote configuration with *standard* Telenet and TCP/IP.
- Network Management — supports both Netview and SNMP.
- Reliable — eliminates single points of network failure.
- Two ports — supports up to ten 3274s in multi-drop mode.
- Multiple unit pricing as low as \$1,800 per unit.



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Circle Reader Service No. 32

TOKEN RING MIGRATION

**Migration
headaches?**

Converting your 3270 network to a token ring LAN doesn't have to be a pain.

Because now you can run token ring over your existing coaxial cable. So you avoid the expense and the hassle of pulling new cable.

Learn more by calling for North Hills' free booklet. You'll find it has the perfect prescription for your migration headache.

North Hills offers a full line of high-performance devices that provide full interoperability with IBM equipment.

"See us at NetWorld, Booth #3220"

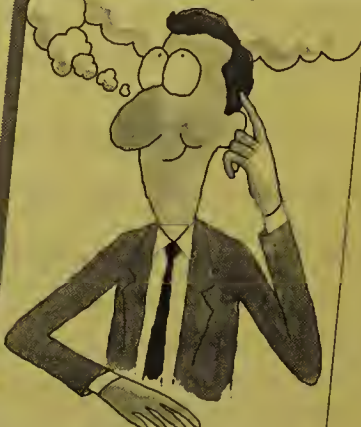
1-800-753-4526

North Hills

A Porta Systems Company
International: P.O. Box 1280, Yokneam 20692, Israel. Tel: 972-4-892902; Fax: 972-4-892743.
Americas: 575 Underhill Blvd., Syosset, NY 11791. Tel: 516-682-7700; Fax: 516-682-7750.

Circle Reader Service No. 33

Suppose you
could magically
turn your 3270
network into a
token ring —
using the coax you
already have.



DATA RACE Announces Multiplexer Breakthrough

NEW Voice/Fax/Data Multiplexer saves end-users
tens of thousands of dollars

By Paul Longoria

SAN ANTONIO, Texas — If you can say yes to the next two questions then you may be in for a pleasant surprise!

1. Do you have remote computer users that need access to your LAN, mini, or mainframe?
2. Would you be interested in eliminating a substantial portion of your expensive long-distance telephone charges?

Powerful, New Technology

Now, thanks to the emergence of a powerful new class of multiplexers, you can save up to \$6,000 per user per year in operating and line costs AND save up to an additional \$23,712 per year in long-distance charges for each phone line you replace!

**"Our company was wasting
\$83,712 a year without DATA
RACE's MACH DS Mux"
— MIS Manager**

Be A Budget Hero!

With today's economic climate, corporate management will be pleased with Data Communication Managers that use this affordable, new technology as an easy, fast way to save on tight budgets.

New Industry Leader

DATA RACE, a long-time price/performance leader in the statistical multiplexer field, is introducing the industry's most cost-effective, high performance Voice/Fax/Data Multiplexer series. From 8 to 64 ports, the new MACH DS multiplexers include these 5 important features:

1. Toll-Free Voice and Fax
2. Up to 3 Voice channels per link
3. Multiple Digital or Analog links
4. Connects to existing facilities
5. Pays for itself in months not years!

Free, No Risk, 30-Day Trial

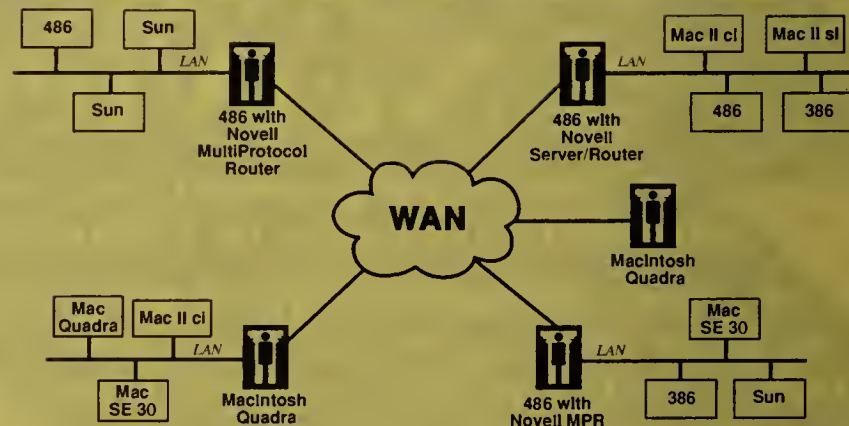
For a limited time, DATA RACE is offering a FREE savings evaluation survey and a FREE 30 day no-risk trial to qualified users. For details call 1-800-329-7223

DATA RACE, 11550 IH 10 West, San Antonio, Texas 78230

Circle Reader Service No. 34

WAN ADAPTERS

The WAN to Desktop Connection

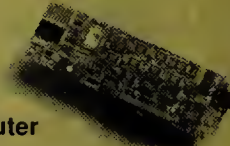


Switched 56K • T1/FT1 • Frame Relay • SMDS



- Intelligent WAN Adapter Cards
- NuBus, ISA, MCA
- AppleTalk, IP, Novell
- AppleTalk Internet Router, Novell MultiProtocol Router

INTEROP'92 Fall
Booth #5877



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Computing Corporation**

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Phone: 805-964-2332

Circle Reader Service No. 35

WAN DATA COMPRESSION

**T1/
FT1**

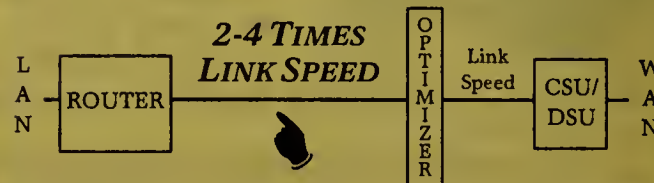
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PROTEON
USERS**

**DATA
COMPRESSION**

LAN/WAN OPTIMIZERS

**Multiplies 2-to-4 Times
Throughput of Your ROUTER
(or Bridge/Gateway/SNA Controller)**

- ★ No Added Packet Latency
- ★ Error-Free Link
- ★ 5 Minute Installation



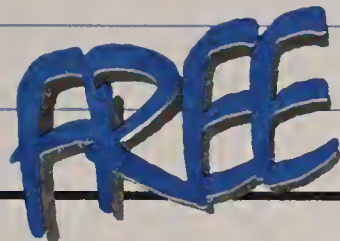
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TELCO SYSTEMS

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Telco Systems, Inc., Magnalink Communications
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OPTIMIZED INTERNETWORKING SOLUTIONS
Circle Reader Service No. 36



Pass-Along Qualification Form

I wish to receive a **FREE** subscription to *Network World*. YES ☐ NO ☐

Signature Date

Business Phone FAX

Name.....

Title.....

Company Name.....

Division/Department.....

Street Address.....

City..... State..... Zip.....

Is this your Business Address? Yes ☐ No ☐
Please Answer **ALL** Questions, Sign and Date the Form.

1 Industry: (check one only)

- 01. ☐ Manufacturers (other than Computer/Communications)
- 02. ☐ Finance/Banking
- 03. ☐ Insurance
- 04. ☐ Real Estate
- 05. ☐ Healthcare Services
- 06. ☐ Legal
- 07. ☐ Hospitality
- 08. ☐ Retail/Wholesale Trade/Business Services
- 09. ☐ Transportation
- 10. ☐ Utilities
- 11. ☐ Education
- 12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
- 13. ☐ Government, State/Local
- 14. ☐ Government, Federal
- 15. ☐ Military
- 16. ☐ Aerospace
- 17. ☐ Consultants (Independent)
- 18. ☐ Carriers
- 19. ☐ Interconnects
- 20. ☐ Manufacturers (Computer/Communications)
- 21. ☐ VAR/VAD/VAN/ Systems Houses
- 22. ☐ Distributors, Computer Related
- 23. ☐ Distributors, Communications Related
- 24. ☐ Other.....

2 What is your job function? (check one only)

NETWORKING MANAGEMENT

- 1. ☐ Networking Mgmt.
- 2. ☐ LAN Mgmt.
- 3. ☐ Datacom/Telecom Mgmt.
- 4. ☐ Engineering Mgmt.

MIS MANAGEMENT

- 5. ☐ MIS, IS, IT Mgmt.
- 6. ☐ Engineering Mgmt.

CORPORATE MANAGEMENT

- 7. ☐ Corporate Mgmt. (CIO, CEO, Pres., VP, Dir., Mgr., Financial Mgmt.)
- 8. ☐ Consultant (Independent)
- 9. ☐ Other.....

3 My responsibilities include: (check one only)

- 1. ☐ LANs/ Internetworking/ WANs
- 2. ☐ LANs/ Internetworking
- 3. ☐ LANs
- 4. ☐ WANs
- 5. ☐ None

4 What is the total number of sites for which you have purchase influence? (check one only)

- 1. ☐ 100+
- 2. ☐ 50 - 99
- 3. ☐ 20 - 49
- 4. ☐ 10 - 19
- 5. ☐ 2 - 9
- 6. ☐ 1
- 7. ☐ None

5 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

- | | |
|---|---|
| A. Scope
(check one only) | B. Involvement
(check all that apply) |
| 1. ☐ Corporatewide | 1. ☐ Recommend/Specify |
| 2. ☐ Multienterprise (consultants) | 2. ☐ Approve |
| 3. ☐ Departmental | 3. ☐ Evaluate |
| | 4. ☐ None (A or B) |

6 Check all that apply in Columns A and B:

- A: I am involved in the purchase of the following products/services.
B: I plan to purchase the following products/services in the next year.

- | Involved | Plan to Purchase |
|---|---|
| A | B |
| ☐ 01. ☐ Local-Area Networks | ☐ 01. ☐ Local-Area Networks |
| ☐ 02. ☐ LAN Servers | ☐ 02. ☐ LAN Servers |
| ☐ 03. ☐ LAN Operating Systems Software | ☐ 03. ☐ LAN Operating Systems Software |
| ☐ 04. ☐ Superservers | ☐ 04. ☐ Superservers |
| ☐ 05. ☐ Data Base Servers (Oracle, Sybase, etc.) | ☐ 05. ☐ Data Base Servers (Oracle, Sybase, etc.) |
| ☐ 06. ☐ Terminal Servers | ☐ 06. ☐ Terminal Servers |
| ☐ 07. ☐ LAN Services | ☐ 07. ☐ LAN Services |
| ☐ 08. ☐ LAN Storage Devices (optical, tape, disk, etc., including backup systems) | ☐ 08. ☐ LAN Storage Devices (optical, tape, disk, etc., including backup systems) |
| ☐ 09. ☐ Network Test Equipment | ☐ 09. ☐ Network Test Equipment |
| ☐ 10. ☐ Hubs | ☐ 10. ☐ Hubs |
| ☐ 11. ☐ Cables, Connectors, Baluns | ☐ 11. ☐ Cables, Connectors, Baluns |
| ☐ 12. ☐ UPS | ☐ 12. ☐ UPS |
| ☐ 13. ☐ Network Adapter Boards | ☐ 13. ☐ Network Adapter Boards |
| ☐ 14. ☐ Peer-to-Peer LANs | ☐ 14. ☐ Peer-to-Peer LANs |
| ☐ 15. ☐ Wireless LANs | ☐ 15. ☐ Wireless LANs |
| ☐ 16. ☐ SNMP Network Management | ☐ 16. ☐ SNMP Network Management |
| ☐ 17. ☐ ATM (Asynchronous Transfer Mode) | ☐ 17. ☐ ATM (Asynchronous Transfer Mode) |

- | | |
|--|--|
| A | B |
| ☐ 18. ☐ Bridges | ☐ 18. ☐ Bridges |
| ☐ 19. ☐ Routers | ☐ 19. ☐ Routers |
| ☐ 20. ☐ Gateways | ☐ 20. ☐ Gateways |
| ☐ 21. ☐ Bridge/Routers | ☐ 21. ☐ Bridge/Routers |
| ☐ 22. ☐ Hubs | ☐ 22. ☐ Hubs |
| ☐ 23. ☐ Intelligent Hubs | ☐ 23. ☐ Intelligent Hubs |
| ☐ 24. ☐ Communications Servers | ☐ 24. ☐ Communications Servers |

Plan to Purchase

- | | |
|---|---|
| A | B |
| ☐ 25. ☐ Micros/PCs | ☐ 25. ☐ Micros/PCs |
| ☐ 26. ☐ Minis | ☐ 26. ☐ Minis |
| ☐ 27. ☐ Mainframes | ☐ 27. ☐ Mainframes |
| ☐ 28. ☐ Pen-Based | ☐ 28. ☐ Pen-Based |
| ☐ 29. ☐ Laptops | ☐ 29. ☐ Laptops |
| ☐ 30. ☐ Workstations | ☐ 30. ☐ Workstations |
| ☐ 31. ☐ Image Processing Workstations | ☐ 31. ☐ Image Processing Workstations |
| ☐ 32. ☐ Front-End Processors | ☐ 32. ☐ Front-End Processors |
| ☐ 33. ☐ Terminals | ☐ 33. ☐ Terminals |
| ☐ 34. ☐ Printers | ☐ 34. ☐ Printers |
| ☐ 35. ☐ Cluster Controllers | ☐ 35. ☐ Cluster Controllers |
| ☐ 36. ☐ Fax Machines | ☐ 36. ☐ Fax Machines |
| ☐ 37. ☐ X-Terminals | ☐ 37. ☐ X-Terminals |

- | | |
|--|--|
| A | B |
| ☐ 38. ☐ Network Management | ☐ 38. ☐ Network Management |
| ☐ 39. ☐ Micro to Mainframe | ☐ 39. ☐ Micro to Mainframe |
| ☐ 40. ☐ Security | ☐ 40. ☐ Security |
| ☐ 41. ☐ Communication/Terminal Emulation | ☐ 41. ☐ Communication/Terminal Emulation |
| ☐ 42. ☐ Word Processing | ☐ 42. ☐ Word Processing |
| ☐ 43. ☐ Operating Systems | ☐ 43. ☐ Operating Systems |
| ☐ 44. ☐ Business Applications (Finance/Mfg/HR) | ☐ 44. ☐ Business Applications (Finance/Mfg/HR) |
| ☐ 45. ☐ Applications Development | ☐ 45. ☐ Applications Development |
| ☐ 46. ☐ Data Base Management | ☐ 46. ☐ Data Base Management |
| ☐ 47. ☐ Spreadsheet | ☐ 47. ☐ Spreadsheet |
| ☐ 48. ☐ Groupware | ☐ 48. ☐ Groupware |
| ☐ 49. ☐ EDI | ☐ 49. ☐ EDI |
| ☐ 50. ☐ E-Mail | ☐ 50. ☐ E-Mail |
| ☐ 51. ☐ Windows/Graphical User Interface | ☐ 51. ☐ Windows/Graphical User Interface |
| ☐ 52. ☐ 4GL/Development | ☐ 52. ☐ 4GL/Development |
| ☐ 53. ☐ Multimedia | ☐ 53. ☐ Multimedia |
| ☐ 54. ☐ Graphics | ☐ 54. ☐ Graphics |
| ☐ 55. ☐ Utilities | ☐ 55. ☐ Utilities |

WIDE-AREA NETWORK EQUIPMENT/SERVICES

- | | |
|--|--|
| A | B |
| ☐ 56. ☐ Modems (9.6K bps and over) | ☐ 56. ☐ Modems (9.6K bps and over) |
| ☐ 57. ☐ Modems (under 9.6K bps) | ☐ 57. ☐ Modems (under 9.6K bps) |
| ☐ 58. ☐ T-1 | ☐ 58. ☐ T-1 |
| ☐ 59. ☐ T-3 | ☐ 59. ☐ T-3 |
| ☐ 60. ☐ Fractional T-1 | ☐ 60. ☐ Fractional T-1 |
| ☐ 61. ☐ Data Switches | ☐ 61. ☐ Data Switches |
| ☐ 62. ☐ SMDS | ☐ 62. ☐ SMDS |
| ☐ 63. ☐ ATM (Asynchronous Transfer Mode) | ☐ 63. ☐ ATM (Asynchronous Transfer Mode) |
| ☐ 64. ☐ Matrix Switches | ☐ 64. ☐ Matrix Switches |
| ☐ 65. ☐ Packet Switches | ☐ 65. ☐ Packet Switches |
| ☐ 66. ☐ Protocol Converters | ☐ 66. ☐ Protocol Converters |
| ☐ 67. ☐ Diagnostic/Test Equipment | ☐ 67. ☐ Diagnostic/Test Equipment |
| ☐ 68. ☐ DSU/CSUs | ☐ 68. ☐ DSU/CSUs |
| ☐ 69. ☐ Microwave | ☐ 69. ☐ Microwave |
| ☐ 70. ☐ Fax Boards/Modems | ☐ 70. ☐ Fax Boards/Modems |
| ☐ 71. ☐ VSAT | ☐ 71. ☐ VSAT |
| ☐ 72. ☐ Fiber Optic | ☐ 72. ☐ Fiber Optic |
| ☐ 73. ☐ Satellite | ☐ 73. ☐ Satellite |
| ☐ 74. ☐ ISDN | ☐ 74. ☐ ISDN |
| ☐ 75. ☐ PBXs (over 1000 lines) | ☐ 75. ☐ PBXs (over 1000 lines) |
| ☐ 76. ☐ PBXs (under 1000 lines) | ☐ 76. ☐ PBXs (under 1000 lines) |
| ☐ 77. ☐ Automatic Call Distributors | ☐ 77. ☐ Automatic Call Distributors |
| ☐ 78. ☐ Voice Messaging Systems | ☐ 78. ☐ Voice Messaging Systems |
| ☐ 79. ☐ Videoconferencing Systems | ☐ 79. ☐ Videoconferencing Systems |
| ☐ 80. ☐ Voice Response/Processing | ☐ 80. ☐ Voice Response/Processing |
| ☐ 81. ☐ Switched Voice | ☐ 81. ☐ Switched Voice |
| ☐ 82. ☐ Dedicated Leased Line | ☐ 82. ☐ Dedicated Leased Line |
| ☐ 83. ☐ Switched Data | ☐ 83. ☐ Switched Data |
| ☐ 84. ☐ Centrex | ☐ 84. ☐ Centrex |
| ☐ 85. ☐ E-Mail/On-Line Information | ☐ 85. ☐ E-Mail/On-Line Information |
| ☐ 86. ☐ Image Processing | ☐ 86. ☐ Image Processing |
| ☐ 87. ☐ Audio Teleconferencing | ☐ 87. ☐ Audio Teleconferencing |
| ☐ 88. ☐ Local Services | ☐ 88. ☐ Local Services |
| ☐ 89. ☐ WATS MTs | ☐ 89. ☐ WATS MTs |
| ☐ 90. ☐ International | ☐ 90. ☐ International |
| ☐ 91. ☐ Virtual Networks | ☐ 91. ☐ Virtual Networks |
| ☐ 92. ☐ Frame Relay | ☐ 92. ☐ Frame Relay |
| ☐ 93. ☐ Value Added Services | ☐ 93. ☐ Value Added Services |
| ☐ XX. ☐ None of the above (1-93) | ☐ XX. ☐ None of the above (1-93) |

7 What is the total number of A: LANs B: Workstations/Nodes in your entire organization?

- | LANs | Workstations/Nodes |
|---|--|
| A | B |
| 1. ☐ 5,000+ | ☐ 1,000 - 4,999 |
| 2. ☐ 1,000 - 4,999 | ☐ 100 - 999 |
| 3. ☐ 100 - 999 | ☐ 50 - 99 |
| 4. ☐ 50 - 99 | ☐ 10 - 49 |
| 5. ☐ 10 - 49 | ☐ 9 or Less |
| 6. ☐ 9 or Less | |

8 Which of the following network platforms are currently installed/planned in the next year?

- | Present | Planned |
|--|--|
| ☐ 01. ☐ SNA | ☐ 01. ☐ SNA |
| ☐ 02. ☐ DECNET | ☐ 02. ☐ DECNET |
| ☐ 03. ☐ MAP/TOP | ☐ 03. ☐ MAP/TOP |
| ☐ 04. ☐ TCP/IP | ☐ 04. ☐ TCP/IP |
| ☐ 05. ☐ DCA (Unisys) | ☐ 05. ☐ DCA (Unisys) |
| ☐ 06. ☐ X.25 | ☐ 06. ☐ X.25 |

- | Present | Planned |
|--|--|
| ☐ 07. ☐ NOVELL IPX/SPX | ☐ 07. ☐ NOVELL IPX/SPX |
| ☐ 08. ☐ APPC/APPN/LU 6.2 | ☐ 08. ☐ APPC/APPN/LU 6.2 |
| ☐ 09. ☐ NETBIOS | ☐ 09. ☐ NETBIOS |
| ☐ 10. ☐ OSI | ☐ 10. ☐ OSI |
| ☐ 11. ☐ APPLETALK | ☐ 11. ☐ APPLETALK |
| ☐ 12. ☐ OTHER | ☐ 12. ☐ OTHER |

LAN OPERATING SYSTEM

- | | |
|--|--|
| ☐ 13. ☐ LOCALTALK (APPLETALK) | ☐ 13. ☐ LOCALTALK (APPLETALK) |
| ☐ 14. ☐ BANYAN (VINES) | ☐ 14. ☐ BANYAN (VINES) |
| ☐ 15. ☐ DCA (IRMALAN) | ☐ 15. ☐ DCA (IRMALAN) |
| ☐ 16. ☐ DCA (10-NET) | ☐ 16. ☐ DCA (10-NET) |
| ☐ 17. ☐ IBM (LAN SERVER) | ☐ 17. ☐ IBM (LAN SERVER) |
| ☐ 18. ☐ IBM (PC LAN PROGRAM) | ☐ 18. ☐ IBM (PC LAN PROGRAM) |
| ☐ 19. ☐ MICROSOFT (LAN MANAGER) | ☐ 19. ☐ MICROSOFT (LAN MANAGER) |
| ☐ 20. ☐ UNGERMANN-BASS (NET/1) | ☐ 20. ☐ UNGERMANN-BASS (NET/1) |
| ☐ 21. ☐ NOVELL (NETWARE, 2X, 3X, 4X) | ☐ 21. ☐ NOVELL (NETWARE, 2X, 3X, 4X) |
| ☐ 22. ☐ PROTEON (PRONET) | ☐ 22. ☐ PROTEON (PRONET) |
| ☐ 23. ☐ SITKA (TOPS) | ☐ 23. ☐ SITKA (TOPS) |
| ☐ 24. ☐ 3COM (3+, 3+OPEN) | ☐ 24. ☐ 3COM (3+, 3+OPEN) |
| ☐ 25. ☐ ARTISOFT (LANTASTIC) | ☐ 25. ☐ ARTISOFT (LANTASTIC) |
| ☐ 26. ☐ HAYES (LANSTEP) | ☐ 26. ☐ HAYES (LANSTEP) |
| ☐ 27. ☐ DEC (PATHWORKS) | ☐ 27. ☐ DEC (PATHWORKS) |
| ☐ 28. ☐ OTHER | ☐ 28. ☐ OTHER |

LAN ENVIRONMENT

- | | |
|--|--|
| ☐ 29. ☐ 4M TOKEN RING | ☐ 29. ☐ 4M TOKEN RING |
| ☐ 30. ☐ 16M TOKEN RING | ☐ 30. ☐ 16M TOKEN RING |
| ☐ 31. ☐ ARCNET | ☐ 31. ☐ ARCNET |
| ☐ 32. ☐ ETHERNET | ☐ 32. ☐ ETHERNET |
| ☐ 33. ☐ STARLAN | ☐ 33. ☐ STARLAN |
| ☐ 34. ☐ FDDI | ☐ 34. ☐ FDDI |
| ☐ 35. ☐ LOCALTALK | ☐ 35. ☐ LOCALTALK |
| ☐ 36. ☐ 10BASE-T | ☐ 36. ☐ 10BASE-T |
| ☐ 37. ☐ OTHER | ☐ 37. ☐ OTHER |

OPERATING SYSTEM

- | | |
|--|--|
| ☐ 38. ☐ DOS | ☐ 38. ☐ DOS |
| ☐ 39. ☐ UNIX/XENIX/AIX | ☐ 39. ☐ UNIX/XENIX/AIX |
| ☐ 40. ☐ OS/2 | ☐ 40. ☐ OS/2 |
| ☐ 41. ☐ OS/2 2.X | ☐ 41. ☐ OS/2 2.X |
| ☐ 42. ☐ MVS | ☐ 42. ☐ MVS |
| ☐ 43. ☐ VM | ☐ 43. ☐ VM |
| ☐ 44. ☐ VMS | ☐ 44. ☐ VMS |
| ☐ 45. ☐ MACINTOSH | ☐ 45. ☐ MACINTOSH |
| ☐ 46. ☐ WINDOWS | ☐ 46. ☐ WINDOWS |
| ☐ N/A 47. ☐ WINDOWS NT | ☐ N/A 47. ☐ WINDOWS NT |
| ☐ 48. ☐ X WINDOWS | ☐ 48. ☐ X WINDOWS |
| ☐ 49. ☐ OTHER | ☐ 49. ☐ OTHER |

9 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

- | | |
|---|---|
| 1. ☐ Europe | 4. ☐ Australia |
| 2. ☐ Asia | 5. ☐ Middle East |
| 3. ☐ South America | 6. ☐ None |

10 Which of the following hardware platforms is installed/planned in your company? (check all that apply)

	Mainframes Currently Installed	Planned Next Year	Minis Currently Installed	Planned Next Year
01. DEC	☐	☐	☐	☐
02. IBM	☐	☐	☐	☐
03. AMDAHL	☐	☐	☐	☐
04. AT&T	☐	☐	☐	☐
05. BULL HNIS	☐	☐	☐	☐
06. DATA GENERAL	☐	☐	☐	☐
07. HP	☐	☐	☐	☐
08. TANDEM	☐	☐	☐	☐
09. UNISYS	☐	☐	☐	☐
10. OTHER	☐	☐	☐	☐

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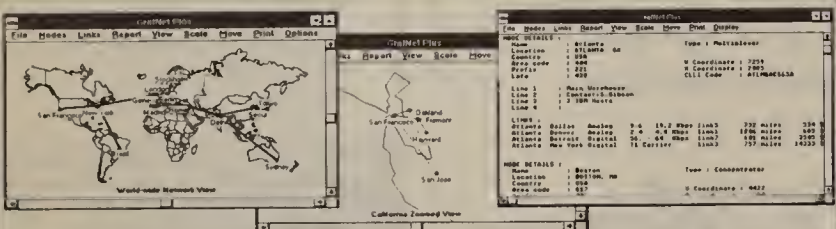
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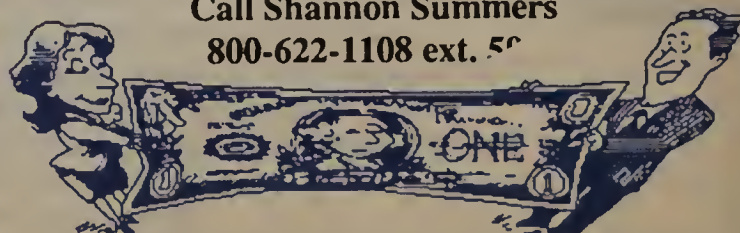
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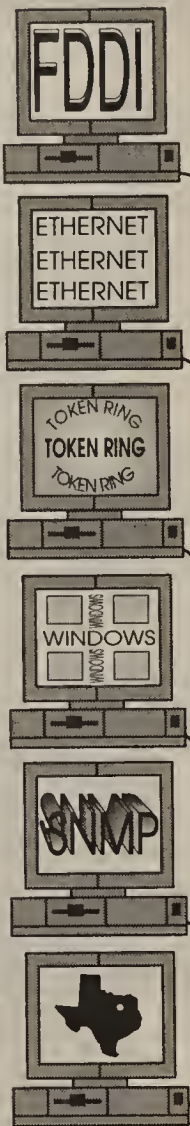
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LAN operating systems

Company	Product	Best suited for	Memory (bytes)		File server CPUs	Max. clients per server	Network adapters	Fault tolerant features				Security features				Storage	Other features				Network management	Price		
			File server (Min./max.)	Client (shell size)				A = Arcnet E = Ethernet T = Token ring O = Other	Disk mirroring	Disk duplexing	UPS support	Error detection and correction	Password	Directory-level security	File-level security		Audit trail	Other	C = CDROM S = SCSI O = Other	Open systems			Client/server	Development utilities
Apple Computer, Inc. (408) 996-1010	AppleShare 3.0	Macintosh networks	4M/ 4G	100K	Any System 7 Macintosh, Macintosh Quadra 700 or 950	2,000	A, E, T, O					✓	✓	✓			✓	S, C, O	✓	✓	✓	✓	T	AppleShare: \$1,199 per server, including support for 120 clients
Banyan Systems, Inc. (508) 898-1000	VINES V. 5.0	Server-to-server communications with large work groups; known to be slower for PC-to-server communications	4M/ 256M	112K	Compaq Computer Corp. DeskPro 386, 486, SMP and compatibles; IBM PS/2	No limit	A, E, T, O	✓			✓	✓	✓	✓	✓	✓	S, O	✓	✓	✓	✓	T, V	5-user package: \$1,295; 10- user package: \$2,495; 20-user package: \$3,995; VINES Unlimited: \$7,495;	
Microsoft Corp. (206) 882-8080	LAN Manager V.2.1	Medium to large networks of between 25 and 200 users	5M/ 16M	640K	Compaq DeskPro 386, 486 and compatibles; IBM PS/2	2,000	A, E, T, O	✓	✓	✓	✓	✓	✓	✓	✓	✓	S, C, O	✓	✓	✓	✓	V	LAN Manager: \$1,995; additional 10-user pack: \$995; unlimited user pack: \$5,495; upgrade to V. 2.1: \$495	
Novell, Inc. (801) 429-7910	NetWare V. 3.11	Small to large networks of between 25 and 250 users or more	2M/ 4G	640K	IBM PS/2, 80386 and compatibles	250	A, E, T, O	✓	✓	✓	✓	✓	✓	✓		✓	S, C, O	✓	✓	✓	✓	V	5-user package: \$1,095; 10- user package: \$2,495; 20-user package: \$3,495; 50-user package: \$4,995; 100-user package: \$6,995; 250-user package: \$12,495	

SCSI = Small Computer System Interface

SOURCE: BSG CONSULTING INC., HOUSTON

(continued from page 81)

the type of client that can be used, particularly in the PC world. If 80286-based devices are used as clients, the NOS software will often chew up most of the available RAM, leaving little leftover to run other applications. With 80386-based clients, RAM is less of a problem because these units typically have more RAM.

To ease this RAM crunch, client software can be stuffed into high memory on PCs with more than 640K bytes of RAM. But this requires users to find contiguous chunks of RAM large enough to support the client software. Some users employ RAM optimization packages such as Quarterdeck Office System's QEMM to help locate such chunks of high memory.

These RAM optimization packages can lend a useful hand when the client must run other RAM-hungry packages, such as Microsoft Windows in the DOS environment and Presentation Manager in the OS/2 world.

The management picture

While NOSes come bundled with plenty of features, there are still some things that are missing, such as rich network management.

Each NOS provides a core of management capabilities, such as administration features that include the ability to set up user accounts, create domains and control printer operations.

However, none provide a full spectrum of management capa-

bilities that provides control over LAN cabling and other components, such as concentrators, hubs and routers. It is up to third-party vendors to supply products that control those components, as well as provide inventory control, audit, backup and recovery.

Frye Computer Systems, Inc. in Boston provides software that documents an entire NetWare LAN. The software polls every LAN device and creates a list of what is stored on hard drives, a process that aids administrators in rebuilding the LAN following a disaster.

Blue Lance of Houston has a variety of software products for the various NOSes. The products track network alarms and create logs that help administrators track which users have logged on to a server, when they logged on and what files they accessed.

Cheyenne Software, Inc. of Roslyn, N.Y., supplies NetWare management software while Trellis Software, Inc. of Hopkinton, Mass., provides management tools for VINES. Both firms offer packages that create graphical maps of networks that can be displayed on an administrator's workstation screen. These packages help administrators quickly locate specific devices and track the growth of the network.

Novell is attempting to complement third-party management products with an optional NLM called Network Management Services (NMS). With NMS, administrators will be able to draw maps of NetWare LANs and control Net-

Ware-attached devices using the Simple Network Management Protocol.

Apple, Microsoft and Banyan don't yet have anything that compares to NMS, and the direction those companies are taking is still unclear.

Novell also leads the way in the list of other available add-on products and utilities. As a general rule, third-party vendors develop products for the NetWare environment first because NetWare has the largest installed base.

Support personnel

Selecting the NOS that provides all the right features won't do any good if no one knows how to use it. Both Novell and Banyan recognize this and have created certification programs aimed at churning out engineers that have a fundamental understanding of their NOSes.

Novell currently offers Certified NetWare Engineer (CNE) and Enterprise Certified NetWare Engineer programs to train its users. Banyan has its Banyan Network Engineer program.

But while there are plenty of certified engineers, certification alone doesn't guarantee the engineer can handle every problem. Only hands-on experience and continuing education can ensure a solid level of understanding.

Microsoft has talked about creating a similar program but, to date, has not done so and it remains unclear if it will.

Apple, on the other hand, feels AppleShare is simple enough for

anyone to use and does not require special training.

Getting your money's worth

After evaluating the features of each NOS, it's time to turn to price. But unlike other major purchase decisions, the price of a NOS shouldn't be much of an issue. Often, users will find that the features they need such as high performance or the ability to build sprawling LAN internetworks will largely dictate the product they will need to buy, regardless of price.

But luckily for users, each NOS carries a reasonable price tag. Take AppleShare, for example. AppleShare costs \$1,119 per server, which includes support for 120 clients.

VINES starts with a five-user package priced at \$1,250 and goes up to \$7,495 for a package supporting an unlimited number of users. NetWare pricing ranges from \$1,095 for a five-user version to \$12,495 for a 250-user version. LAN Manager pricing starts at \$1,995 for a five-user package and goes up to \$5,495 for a package supporting unlimited users.

The reasonable pricing for each NOS leaves users free to be more critical in evaluating NOSes on a feature-by-feature basis, including the features discussed here.

Other key criteria users can employ to judge each NOS include each vendor's financial stability, the availability of options, the level of interoperability with

other NOSes and each vendor's track record in providing technical support.

And that's not all. Users should query each NOS vendor on their intentions to support open systems that will provide server and client platform independence as well as client/server application support, including the availability of programmer libraries or application program interfaces. Lastly, users need to ask about disk storage limitations and remote connectivity support. features pointed out in the chart on this page.

The strengths of each vendor's offering in all of these additional areas will affect decisions that are made years down the road when the LAN expands or users start making special requests for advanced features or more functionality.

Each NOS vendor has something to offer that the others don't, which benefits users. It gives them a choice based on their requirements.

Remember, however, that the perfect NOS has yet to be developed. Right now, users must integrate disparate pieces of hardware and software to get what they really need. ▀

Janusattis is a manager with BSG Consulting, Inc. in Houston and is a certified information systems auditor, a Novell CNE and a certified disaster recovery planner. He can be reached at (800) 875-1274.

Fitting LANs into enterprise mgmt.

continued from page 72

NodeVision and Saber/LAA will soon hook into Novell's NMS, enabling NodeVision to read NMS' Btrieve databases.

"This way, when NMS determines there is a fault with a desktop node, NodeVision can be used to help determine what went wrong and why," Dixon says.

In much the same way, Saber/LAA will appear as an icon within Novell's NSM, the Windows-based console of the NMS, and the LAA console will be able to use data collected by the NMS.

It is this type of LAN management that interests Eric Fairhurst, an information center analyst for Delta Faucet Co. in Indianapolis. The company's network comprises five NetWare 3.11 servers and about 500 DOS and Windows workstations.

The company currently uses Brightwork Development, Inc.'s NetRemote for Windows for remote control and troubleshooting, and uses that firm's SiteLock for controlling its site licenses.

"We're trying to flesh out all the issues involved in LAN management, and NMS and third-party applications are certainly on the list," Fairhurst says.

While products such as NodeVision and Saber/LAA rely on proprietary communications to relay data, other applications use a proxy agent technique. These products can cull data via proprietary techniques at the node level and passing it to an agent that converts it to SNMP formats and relays it to an SNMP manager.

One of the biggest concerns is SNMP's lack of security.

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The benefit of this approach is that the devices can still be centrally monitored via SNMP managers, but vendors can go beyond the limitations of SNMP at the node level and institute their own techniques for monitoring activity and making fixes.

These types of applications focus largely on tracking activity of network interface cards or performance of hard drives.

Both Microcom's LANLord and 3Com's LinkWatch use proprietary agents on workstations that report to a local management server. This server — OS/2-based for LANLord and NetWare Loadable Module-based for LinkWatch — translates the network management data to SNMP.

Both are designed to work with higher end net management platforms such as Novell's NMS or HP's OpenView, but LANLord includes a Windows-based application that can be used if a network manager does not have such a platform.

Both products use significantly less workstation memory than a full SNMP protocol stack. LANLord's agent is essentially based on SNMP over IPX (as opposed to IP, the protocol required for the full SNMP protocol), but certain functions of SNMP,

including ASN.1 and "Get next" have been removed to conserve memory. Since Microcom uses its proprietary techniques at the node level, it can pass data to an agent via bulk transfers, instead of adhering to SNMP's polling routine.

3Com's LinkWatch conserves memory by integrating the agent directly into the

Three stages of LAN management

1. Consolidation of management information with individual LAN segments
2. Standardized exchange of management data between remote LANs
3. Integration of LAN management data at the enterprise level

Open Data Link Interface (ODI) or Network Driver Interface Specification driver for the firm's Ethernet cards. Some users of LinkWatch on NetWare LANs have reported that the agent eats up just 1,900 bytes of workstation memory, while full SNMP protocols often take 50K bytes.

"We believe that adapter manufacturers ought to be providing SNMP manageability in the same way that hub or router vendors do," says Roy Johnson, director of product management at 3Com. Those vendors implement SNMP stacks in firmware to reduce memory consumption on the client. "This type of integration reduces memory usage and eases the process of upgrading to new management standards," he adds.

LinkWatch takes a slightly different approach than LANLord when it comes to a management console. "The last thing our users want is another network management workstation to deal with," Johnson says. 3Com has chosen Sun's SunNet Manager as its platform of choice, but LinkWatch works equally well with other platforms such as NMS or OpenView.

Rick Hornbeck, a net administrator at Deaconess Hospital in Evansville, Ind., is a LinkWatch user. In a massive downsizing effort, the hospital's minicomputer-based applications will soon be distributed over 30 departmental LANs with more than 600 connected workstations. The network staff currently uses Ungermann-Bass, Inc. hubs with 3Com Ethernet adapters and Hughes Network Systems, Inc. ProLink software in all of the workstations.

"We have to use so many protocols — IPX, [Network File System, Local Area Transport] and TCP/IP — at the workstation already, we couldn't afford to give up a lot more memory for SNMP manageability," Hornbeck says. "We looked at ProLink's and [The Wollongong Group, Inc.'s] SNMP stacks, but they took up from 30K to 100K bytes of RAM. 3Com's only uses 5K added memory in our configuration."

Hooking into the enterprise

With the exception of NetView/6000, none of the products so far are designed to manage the entire enterprise like integrated network managers such as like HP's OpenView, Sun's SunNet Manager or IBM's NetView/390.

Most LAN-oriented systems are not based on enterprise-oriented platforms

such as Unix or MVS. "NMS is not focused on building an enterprise manager," Turner says. "We're not trying to manage everything from mainframe resources to building elevators. We're focused on the client/server and LAN environments."

But for many users, LAN management needs to tie into enterprise management. Unisys Corp.'s Gregg Kreizman, who is the supervisor of LAN program development under contract to the Environmental Protection Agency, has 14,000 PCs and 275 NetWare servers over 14 major EPA sites. All sites are connected over an SNA X.25 network, and IBM's NetView and LAN Manager are used to control the backbones.

Needless to say, the choice of a tool to manage the local Token-Ring Networks must integrate well with NetView. "Every platform has a product that's ideal for it and it alone," Kreizman says. "We see the combination of NetView- and SNMP-based tools as a place where these different platforms can work together."

Steve Clevenger, senior vice-president for information services at Colonial Penn Group, Inc. agrees. "We've given a lot of effort to centralize control of our network management at the host level with NetView," he says. "We'll look at NetView/6000 and the DSM to see if they will help distribute responsibility, but all key information must be accessible through the applications on the host."

What's next?

The movement toward OSI continues, but as The Burton Group's Lewis says, "The momentum behind SNMP is unstoppable." Until CMIP products are widely available, many users will use SNMP as an interim step to CMIP.

"[The Government OSI Profile] is mandated in the not-too-distant future, but the components for OSI are just not there today," says Westinghouse Hanford's Blackmore. "We see TCP/IP and SNMP as a stepping-stone from the XNS protocol in our

“Every platform has a product that's ideal for it and it alone.”

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LAN Manager networks to OSI and CMIP."

Another trend is to incorporate more systems management into the scope of network management. "It's important to focus not only on managing the physical components but also on the applications and other network resources," Lewis says.

Software distribution and applications metering can be accomplished today with separate products but rarely can they be managed from within a single platform.

"We should all take the best of what we've learned over the last 15 to 20 years in the mainframe environment and find out how to apply it in the distributed world," Microcom's Woods says. □

Rhodes is a free-lance writer based in Lubbock, Texas.

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Bridging the security gap

continued from page 15

trator to intercept packets traveling from a workstation to a file server or vice versa. However, most of the currently installed hubs and concentrators lack this option.

Several companies, such as Verdex Corp. of Herndon, Va., offer a combination of hardware and software that uses the Data Encryption Standard to encrypt all data transfers across the wire. But many experts believe that kind of solution is too cumbersome and costly to be implemented in average LAN environments.

Another option for added security consists of a combination of authentication and encryption at the application level. For instance, many application packages such as word processors or spreadsheets have encryption options.

The lack of standards is a major hurdle for network users. Although an Institute of Electrical and Electronics Engineers, Inc. committee has been working on security extensions to Ethernet, token-ring and other 802.X networks, a standard is not in sight.

Novell stressed that a strict im-

plementation of existing NetWare security mechanisms will help make the network less vulnerable to attacks. The company suggests users force periodic password changes, enforce log-on station restrictions, require unique passwords, restrict use of the supervisor's account and keep file servers in a secure place.

These measures, however, do not offer a guaranteed shield against intruder attempts based on the Leiden program. This explains why Novell is putting most of its top engineers, including the principal NetWare architects, on the Phase I security project.

Noorda said he is confident the Leiden discovery will be "valuable in advancing our efforts to provide customers with the most secure networks in the industry."

"We have millions of users worldwide, and this is the first time that a security problem of this magnitude has surfaced," he said.

For Novell, it is of eminent importance that it will also be the last time. ☐

Jan Jacobs is the editor of LanMagazine, a European International Data Group publication.

Packs offer SNMP control of LANs

continued from page 4

der, Colo. "They're offering an SNMP alternative to NMS. It's just their first product, so it's not a complete solution, but if they open it up to handle more than NetWare later, it should be a pretty powerful offering."

According to Mark Smith, president of Network Edge, the firm plans to widen its offerings to manage other LANs, such as Microsoft Corp.'s LAN Manager and Banyan Systems, Inc.'s VINES, and to run on other management platforms such as Sun-Connect's SunNet Manager, but he declined to provide a time frame for these products.

The first product line, StationView, is designed to manage LAN-attached workstations and consists of three components.

The StationView Proxy Agent is a NetWare Loadable Module that runs on the server, monitors attached workstations and provides SNMP data to a central management application. Because the agent resides on the server, each managed workstation does not need to accommodate a terminate-and-stay-resident (TSR) program for communicating data to the central station, the compa-

ny said.

StationView/OV is a management application, based on the Motif graphical user interface, that runs in conjunction with OpenView on the central OpenView management console. It

The firm plans to widen its offerings to manage other LANs such as LAN Manager.

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communicates with the StationView Proxy Agents at user-defined intervals to provide central monitoring and control of NetWare workstations, including the ability to change their configuration.

StationView/DOS is a stand-alone application that runs under DOS or Microsoft's Windows and provides work group and end-user management of NetWare workstations for sites that do not

have or yet need a central management platform such as OpenView.

The second product line, ServerView, is designed to manage Novell servers and consists of a ServerView Proxy Agent, a Motif-based ServerView/OV application that runs in conjunction with OpenView and ServerView/DOS for DOS- or Windows-based work group management.

ServerView provides information in the five Open Systems Interconnection-defined areas of fault, configuration, performance, security and accounting management. It can warn users of impending problems such as a disk running out of space or can notify the central management station of existing problems such as a broken network connection.

StationView and ServerView agents are each priced at \$399 per server and can be bundled with the DOS management software for \$599 per server. The DOS software costs \$399 per server if bought separately. StationView/OV and ServerView/OV each cost \$3,995 per OpenView console. The StationView products will be available in December, while the ServerView software is scheduled to ship in March. ☐

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FCC lets foreign carriers compete

continued from page 2

based in Montclair, N.J. The FCC moves will likely spur more resellers to enter the market, and as that occurs, prices from all of the carriers will be driven down, Langner said.

Brian Moir, counsel for the International Communications Association, agreed. "The Canadian price structure is way out of whack with costs," he said. "The new resale rules will help provide pressure on the underlying service rates."

The FCC opened the U.S. market to the resale of switched services over private lines when it voted to allow FONOROLA Corp., one of Canada's three largest resellers, to begin selling switched services between the U.S. and Canada over private lines. The reseller is the first carrier to take advantage of rules the FCC adopted last December that allow such resale if a carrier proves its home country has equivalent resale opportunities for U.S. carriers.

After evaluating Canadian regulations and market conditions, the FCC concluded that Canada offers equivalent resale opportunities to those requested

by FONOROLA. There are 80 resellers operating in Canada, and 11 of those are U.S. companies, said Cheryl Tritt, chief of the FCC's Common Carrier Bureau.

The FONOROLA decision means resale to other countries such as the U.K. is likely to follow, Langner said.

Resale operations are expected to benefit users not only by providing alternative service arrangements, but also by lowering the prices of traditional international switched services, Tritt said.

That is because resale operations are not subject to international accounting rates, which define the cost of shipping traffic between two countries. Instead, resellers only pay access charges for calls that are terminated in a foreign country. Accounting rates to virtually every country are overpriced, by as much as 150% in some instances, according to FCC figures.

If users are able to pull switched traffic off of the public switched network and route it over a reseller's private-line networks, then public carriers will have an incentive to lower their accounting rates, Langner said.

The U.K. is ripe for resale because its market is competitive

and the resale of switched services is already allowed with other countries, Langner said. Although the U.K. has negotiated lower accounting rates with U.S. carriers over the last few years, "rates from the U.S. to the U.K. are still nowhere near cost-based," Langner said.

Last week's FCC decision to lift many regulations on nondominant foreign carriers operating in the U.S. is likely to further spur resale with the U.K., Langner said. It is quite easy for a U.S. carrier to set up an operation in the U.K., but U.K. carriers in the U.S. have been subject to cumbersome rules applied to dominant carriers here, Langner said.

Under the rules adopted last week, any carrier that can prove its parent or corporate affiliate in a foreign country is a nondominant carrier there will receive nondominant status here.

For example, Cable & Wireless North America, Inc., whose parent company in the U.K. is nondominant there, could probably qualify for nondominant treatment for traffic to the U.K., Tritt said. However, since Cable & Wireless has a monopoly in Hong Kong, service between the U.S. and the U.K. would still fall under the dominant carrier rules. ■

Timeplex offers low-end switch

continued from page 2

For Timepac, the previous entry point was the Timepac NP100E, a 20-port, 100 packet/sec device with synchronous data rates of 64K bit/sec and asynchronous speeds from 50 to 38.4K bit/sec.

The Time/LAN Access Router routes Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX), DECnet Phase IV, AppleTalk and Open Systems Interconnection protocols, and features automatic software downloading and alternate routing.

For wide-area links, the router supports a 128K bit/sec RS-232 port and two RS-232/V.28, V.35, RS-449 or V.11 ports at speeds up to 2M bit/sec. The 128K bit/sec RS-232 ports can also be used to link locally situated SDLC, X.25 and frame relay devices.

On the local side, the Time/LAN Access Router supports one or two Ethernets or one token-ring local-area network.

The Time/LAN Access Router also supports media access control layer and source routing transparent bridging, as well as the Open Shortest Path First and Point-to-Point Protocol routing

protocols. It also features access control filtering, which enables network managers to block certain data from entering the network, and prioritization of delay sensitive traffic, which allows user to give certain data routing preferences.

The Timepac Branch Nodal Processor supports V.28, V.35, X.21, X.21bis and ISDN interfaces. Port speeds range from 50 to 19.2K bit/sec for asynchronous traffic and 128K bit/sec for synchronous data.

The new switch processes 200 packet/sec and incorporates Ascom Timeplex's dynamic adaptive routing algorithm, a proprietary, connectionless routing technique that selects the fastest path for data and reroutes around failures and congestion.

The Timepac Branch Nodal Processor also features automatic dial backup and downloadable software upgrades.

The Time/LAN Access Router is priced from \$5,250 to \$7,495, depending on configuration. It will be available in March. The Timepac Branch Nodal Processor is priced at \$4,000 and will be available in April. ■

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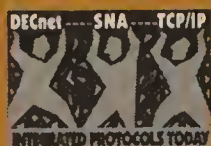
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IBM offers first glimpse at router

continued from page 2

ken-ring and serial ports to their capacity when transmitting packet sizes that are typical of user environments today, such as SNA, Novell and DECnet networks."

According to IBM, the 6611 was able to reach wire speed on both of the local-area network media it supports — 10M bit/sec for Ethernet and 4M or 16M bit/sec for token-ring LANs. The router can fill token ring's 4M bit/sec maximum speed when using packet sizes of 128 bytes or greater as well as 16M bit/sec token ring when transmitting 512-byte packets or greater. It can support Ethernet traffic at media speed for 256-byte packets or greater.

When 64-byte packets are used, the 6611 can support about 3,900 packet/sec on token ring and up to 4,600 packet/sec on Ethernet.

The router, when transmitting data

across a serial interface, can support the 1.5M bit/sec T-1 speed in one direction when using 64-byte packets. And, more importantly, it can handle bidirectional, full-duplex T-1 speeds, which provide an aggregate throughput of nearly 3M bit/sec.

For source route bridging, the 6611 performs as well as IBM's 8209 bridge for small frames of 32- and 64-byte packets and at media speed when using packet sizes above 512 bytes.

All of these tests were performed when forwarding packets across two ports. The router's ability to handle multiple ports simultaneously — describing its maximum capacity — depends on the number and types of adapters installed. The 6611's current capacity is about 15,000 packet/sec for 64-byte packets. At larger frame sizes, the 6611 can forward about 26M bit/sec of data.

When measuring the router's ability to
(continued on page 102)

IBM doles out LAN management goods

continued from page 6

Distribution Manager (NVDM) and NVDM/2 products — host- and OS/2-based software distribution tools, respectively — will also be CID-compliant, enabling them to take advantage of CID's automation and other functions.

Users were happy with IBM's announcement but wary of its delivery dates.

IBM said all of its LANfocus products would be available in the second quarter of 1993. LANfocus Manage/2 will cost \$1,245, LANfocus View/2 will cost \$595, LANfocus Enable/2 and LANfocus Agents will run \$55 each, and LANfocus Agents Extended will cost \$75.

The NVDM products will be available Dec. 28. NVDM for MVS will sell for between \$41,580 and \$259,250. NVDM/2 will sell for \$1,495 in a server configuration and \$95 as a client. □

Cabletron sees Blue

continued from page 1

Multi Media Access Center (MMAC) hub.

SNACMIM is based on technology from Sync Research, Inc., which makes the SNA Converter/Token-Ring Concentrator (SNAC/TRC), a Synchronous Data Link Control-to-802.2 Logical Link Control 2 (LLC2) conversion device.

Cluster controllers and other SNA PU 2 devices attach directly to the module via an SDLC connection, and the module converts the traffic to LLC2 so it can be carried over a token-ring local-area network.

SNACMIM protects users' investments in their installed base of older SNA devices that cannot attach to token ring and eliminates the need to rely on separate devices such as routers or the SNAC/TRC to support the conversion function.

SNACMIM can be configured with either two or four ports and supports as many as 16 physical units. The number of sessions supported depends on the controller.

The two-port version is priced at \$3,495, while the four-port model costs \$5,195. Both products will be available in January. While priced comparably to Sync's SNAC/TRC, Cabletron's SNACMIM-MMAC combination offers more functionality because of the integrated bridging, routing and management capabilities available in the MMAC.

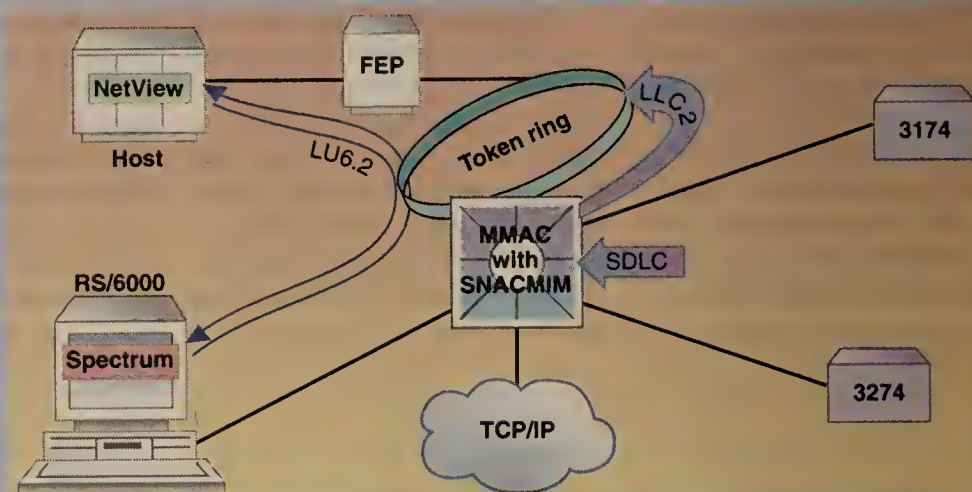
The second half of Cabletron's SNA announcement involves a tool kit for Spectrum, dubbed BlueVision, which was jointly developed with NetTech, Inc., a software company in Raleigh, N.C., that specializes in SNA network management.

Instead of making Spectrum a slave to IBM's NetView, Cabletron is positioning the two systems as partners, with Spectrum as the main presentation platform.

BlueVision consists of a software component that runs on the host and a second component that runs on Spectrum. It provides a peer-to-peer connection between Spectrum and NetView via two LU 6.2 sessions that allow Spectrum to query NetView for VTAM and host-based application information, as well as receive unsolicited information such as alerts and changes in VTAM status.

According to Cabletron, the Spectrum

Cabletron dons Blue-colored glasses



FEP = Front-end processor MMAC = Multi Media Access Center
LLC2 = Logical Link Control 2 SNACMIM = SNA Network Access Controller Media Interface Module

Cabletron's SNA strategy includes SDLC-to-LLC2 conversion capabilities that enable its hubs to support devices such as cluster controllers and enhancements that make its Spectrum net management system a peer to IBM's NetView.

GRAPHIC BY SUSAN SLATER

SOURCE: CABLETRON SYSTEMS, INC., ROCHESTER, N.H.

GUI, which is based on the Open Software Foundation, Inc.'s Motif GUI, functions more efficiently than IBM's NetCenter GUI because it offers better graphics, can manage both applications and devices, and supports SNMP-based elements.

BlueVision also includes an option that allows net managers to use native NetView commands and text screens on Spectrum's RISC System/6000 platform.

"Cabletron is really trying to combine the LAN and NetView environments," said Paul Callahan, senior analyst at Forrester Research, Inc., a consultancy in Cambridge, Mass. "By rolling their own and going with a nonstandard software platform, they're taking a risk, but they've done a phenomenal job. It's ambitious and clearly the most sophisticated management system on the market."

Blue Cross and Blue Shield of Connecticut will be a beta-test site and development center for BlueVision.

"NetView is text-based, and the more complicated your network gets, the more complex NetView gets," said Graham Morrison, project leader for network engineering and design at the health insurance firm in North Haven, Conn. "BlueVision will give our help desk people a better understanding of the resources they're trying to query on the SNA net because it's graphical

in nature and much easier to work with."

BlueVision is priced starting at \$14,995. Optional tool kits, such as the ability to manage host-based applications, will be sold separately. The offering will be available in March 1993.

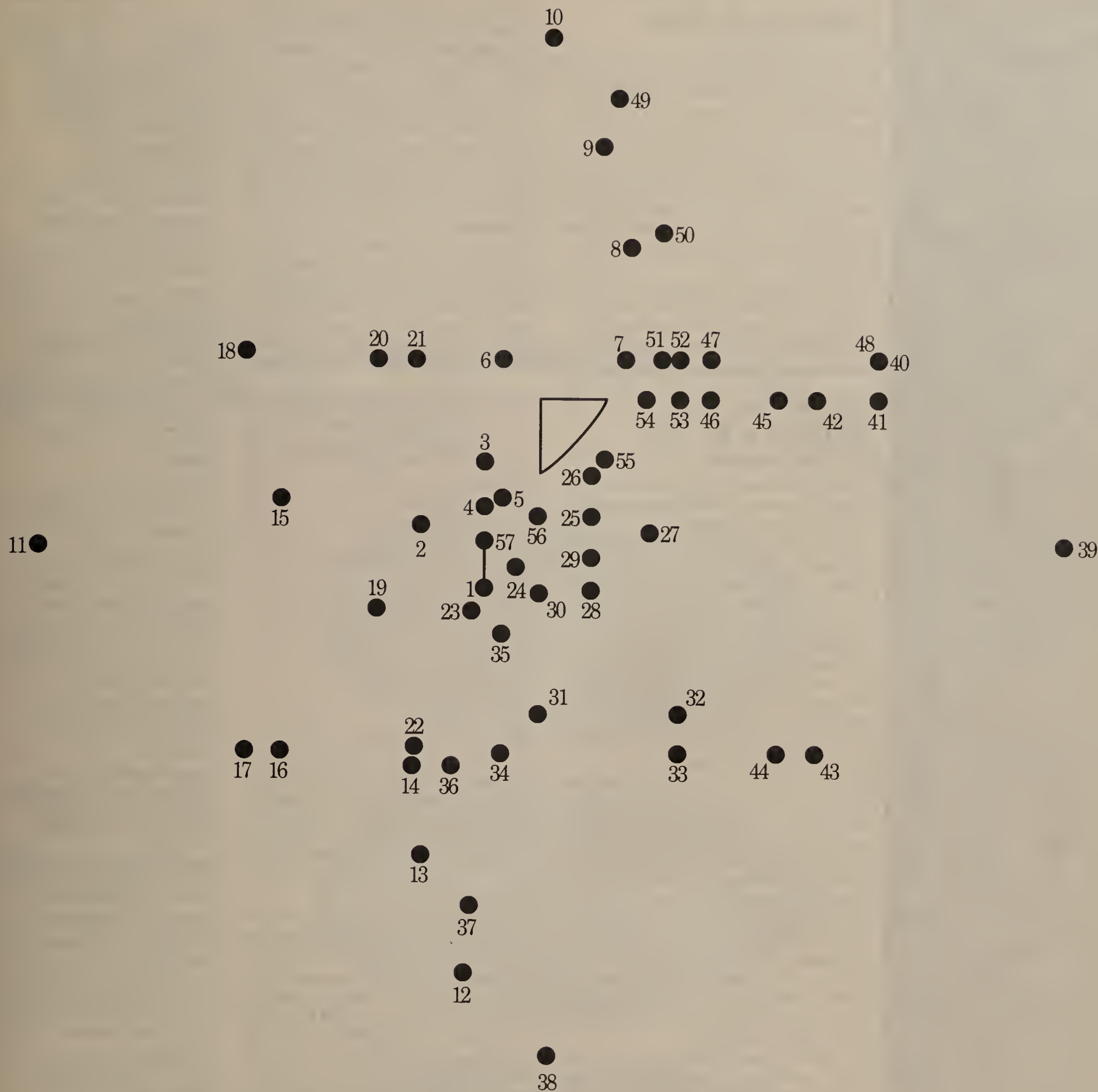
In conjunction with the SNA-related announcements, Cabletron also expanded its token-ring line with a bridge module for its MMAC hub and a new line of fixed-port token-ring hubs.

The Token Ring Bridging Media Interface Module (TRBMIM) is a two-port local source routing bridge and management module for the MMAC that supports both 4M and 16M bit/sec token ring. The module can be used to bridge between token-ring LANs within the hub as well as manage the hub's other modules.

The TRBMIM costs \$6,995 and will be available in January.

Rounding out Cabletron's token-ring announcement was the TRXI line of fixed-port hubs. Available in 12- and 24-port versions, the TRXI supports shielded or unshielded twisted-pair connections and can be managed by any SNMP-based net management system.

The 12-port model is priced at \$3,995 and the 24-port version lists for \$4,995. Both models will be available in January. □



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[Just in case you can't
draw a straight line.]

AT&T, MCI launch battle over 800

continued from page 4

to an AT&T term plan now to receive instant rate relief, or to await portability and pay higher AT&T rates in the interim," MCI said.

Also last week, AT&T went to court to get more freedom to market 800 services. AT&T asked the U.S. Court of Appeals for the District of Columbia to step in by January and force the FCC to decide whether 800 bundling prohibitions should apply to all carriers.

AT&T escalated the issue after the FCC failed to rule on a similar request the carrier filed at the agency in November 1991. The FCC banned AT&T from bundling 800

service with new Tariff 12 or contract deals until 800 numbers are portable. It reasoned that AT&T's 80% share of the 800 market would enable the company to unfairly leverage that power to sell other services as part of those packages.

The legal wrangling adds yet another layer of controversy and confusion to the 800 market for users. In addition to questions about the marketing of 800 services, there are still dozens of technical and administrative questions remaining about 800 portability.

Users are so alarmed by the direction 800 portability is taking that a group of financial users last month formally asked the FCC to push back the deadline by three months to June 1993 ("Users press for delay in 800 portability," NW, Oct. 5). □

Group to link Windows to SNA

continued from page 1

ly must use when building Windows applications that work with different vendors' SNA connectivity products.

"By getting all [20 vendors] to agree to a standard, we will see more Windows applications that connect better into SNA because developers can write to a single API instead of having to pick from individual vendor implementations," said Mike Fritz, Microsoft's group marketing manager.

It will also give users the freedom to change SNA connectivity products without rewriting their Windows applications.

The Windows SNA API helps round out Microsoft's Windows Open Services Architecture (WOSA), which consists of a number of standard, open interfaces for integrating Windows applications into users' multivendor computing environments. Other WOSA APIs define standards for linking Windows applications to multivendor databases and E-mail engines, and for linking Windows and Unix applications.

Microsoft this summer initiated efforts to develop the Windows SNA API by recruiting a host of vendors — including IBM, Digital Equipment Corp. and Novell, Inc. — to define a common specification (see graphic, this page).

IBM's representatives made sure the new specification remained consistent with existing IBM SNA APIs, Fritz said.

"We worked with Microsoft to make sure the Windows SNA APIs closely matched the IBM-defined SNA APIs," said Jack Sanders, an IBM senior engineer.

Each Windows SNA API has a distinct function. HLLAPI is for personal computer programs emulating IBM 3270 functions; CPI-C and APPC support cooperative processing applications across IBM platforms using the LU 6.2 protocol; LU 0 is used to perform user-defined functions over SNA data streams; and CSV is used to access IBM's NetView net management system.

Anura Guruge, an independent consultant in Ipswich, N.H., said he was concerned that the CPI-C implementation within the Windows SNA API might be significantly different from IBM's implementation. IBM introduced CPI-C several years ago as a standard way of implementing APPC across IBM platforms.

"I'm worried that a group of vendors might take poetic license with CPI-C and undermine the value and integrity of the

Standardizing Windows/SNA connectivity

Vendors that helped develop the Windows SNA API

- Andrew Corp.
- Attachmate Corp.
- Computer Logics, Ltd.
- Data Connection Corp.
- Digital Communications Associates
- Easel Corp.
- Eicon Technology Corp.
- FutureSoft Engineering, Inc.
- IBM
- ICOT Corp.
- International Computers, Ltd.
- Microsoft Corp.
- Multi-Soft, Inc.
- NCR Corp.
- Network Software Associates, Inc.
- Novell, Inc.
- Olivetti & Co. S.p.A.
- Siemens Nixdorf Informationsysteme AG
- Systems Strategies, Inc.
- Wall Data, Inc.

SOURCE: MICROSOFT, REDMOND, WASH.

API," Guruge said.

Sanders said the Windows SNA API version of CPI-C remains faithful to IBM's implementation, although he said there are a few Windows-specific extensions. That is not unusual, he said, because there are CPI-C extensions for most IBM platforms.

According to David Passmore, a vice-president at Gartner Group, Inc. in Stamford, Conn., the new API provides a shot in the arm to IBM's APPC Enablement Group, whose mission is to foster greater usage of APPC/LU 6.2. "The Windows SNA API will make it easier for IBM customers with Windows clients to write client/server applications for their SNA networks utilizing LU 6.2," Passmore said.

Currently, most client/server applications for SNA networks require OS/2 or DOS clients, or use 3270-emulation products. Few companies have implemented OS/2 as clients, and DOS and 3270-emulation products minimize client/server functionality, Passmore said.

Microsoft said its implementation of Windows SNA API will work in a client/server platform with Windows, Windows NT and DOS clients supported by a Windows NT server.

The 300-page specification is available immediately at no charge from Microsoft or any other vendor that helped write Windows SNA API. It will also be available on CompuServe, Inc.'s CompuServe service within 30 to 60 days. □

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Not long ago, identical fossil types were discovered in South America and Africa. A rather curious unearthing, given that the two continents are noted today for their uniquely different species. To explain this finding, the naturalist Alfred Wegener correctly proposed the idea that long before our knuckle dragging ancestors made their foray onto the planet, Earth's continents had once been a single land mass that later split apart. What we are referring to, of course, is the theory of continental drift.

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MFS spins fiber web to link nets

continued from page 1

cuts over links between New York, Chicago and Washington, D.C. on Dec. 1. The rest of the cities will be connected by the middle of next year.

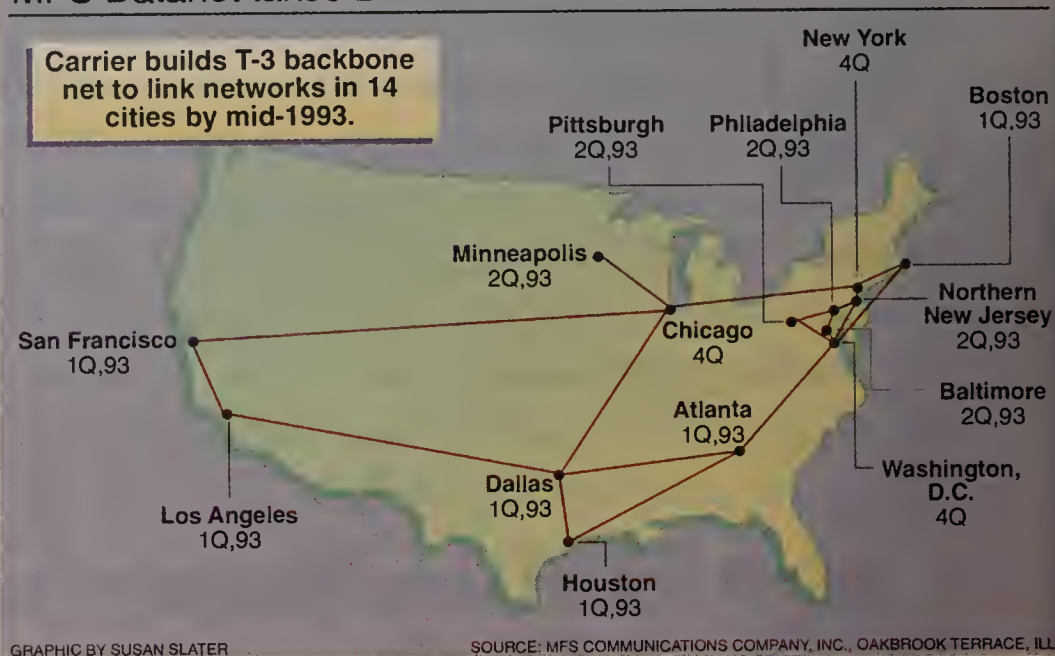
Scott Yeager, vice-president of sales and distribution for MFS Datanet, said, "Probably 90% of the end users we deal with that have multiple sites in one city have sites in another city. We're hoping [they] have the need to link [their] LANs."

At least one current MFS Datanet customer says the offering sounds appealing. "We'll definitely take a hard look at connecting FDDI LANs in different cities using the national MFS Datanet service," said Ping Li, acting branch chief for automatic data processing user services with the National Aeronautics and Space Administration in Washington. "Especially if they continue their approach of marketing lines as a turnkey package."

The T-3 net the company plans to build will use facilities leased from two carriers that MFS Datanet declined to identify. The carrier is also evaluating ATM switches from BBN Communications, Siemens AG, NEC America, Inc., Fujitsu America, Inc., GTE Corp. and Ericsson.

According to Al Fenn, president and chief operating officer for MFS Datanet, the carrier will install at least one ATM switch in each of the 14 cities and will not necessarily use the same make of switch in each. Fenn said that if the switches adhere to the ATM Forum's interoperability specification, compatibility problems should be mitigated. The switches will be linked using fiber provided by the two carriers, one

MFS Datanet takes LAN interconnection services nationwide



handling about 80% of the backbone lines and the other providing the remainder.

The network will enable MFS to extend its four Highspeed LAN Interconnection (HLI) services — offerings that are currently available in New York, Washington, Chicago, Los Angeles and Houston ("MFS offers LAN internet service line," *NW*, Aug. 26, 1991).

The first, HLI Ethernet Interconnection, is available in three versions: fractional, dedicated and virtual. The fractional version enables users to link Ethernets at 1.544M bit/sec and is designed for users that have low traffic demands.

The virtual and dedicated varieties support transmission at 10M bit/sec, the difference being that the virtual option uses shared pipes and performance can be bogged down by contention delays during

peak traffic periods. With the dedicated version of the service, users get their own 10M bit/sec pipe.

The second service, HLI Token Ring Interconnection, lets users interconnect token-ring LANs at varying speeds and is available in the same three versions as the Ethernet service. The fractional version allows users to link token rings at 1.544M bit/sec on a shared line, while the virtual and dedicated versions support transmission at 4M or 16M bit/sec.

With the third offering, HLI FDDI Interconnection, MFS Datanet provides users with point-to-point FDDI links that can support 20M to 30M bit/sec of throughput. The fourth, HLI Custom Interconnection, enables users to interconnect mainframe and supercomputers. It supports 2M or 4.5M byte/sec data transfers. □

IBM offers first glimpse at router

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support SNA traffic, Goethals said IBM chose transactions per second over packets per second as a more appropriate measure of performance.

Because the 6611 was designed primarily to maximize wide-area network bandwidth and maintain SNA session connectivity, the test measured how well the router utilized the available bandwidth.

DLS reduces overhead

IBM's technique for transporting SNA traffic across a multiprotocol backbone, dubbed Data Link Switching (DLS), enables the router to acknowledge receipt of SNA frames from locally attached hosts and handle link-layer flow control for SNA sessions, which reduces SNA overhead.

The feature also allows the 6611 to respond to SDLC session polls and keep alive messages for 802.2 Logical Link Control 2 sessions on behalf of remote devices. This minimizes SNA session time-outs caused by failures and congestion.

The tests showed that the 6611 using DLS could support between 50 and 100 transactions per second on a T-1 link, depending on packet size.

When DLS throughput was measured from Token-Ring to Token-Ring across a 56K bit/sec line, the entire bandwidth of the full-duplex 56K bit/sec could be filled. According to IBM, the DLS flow control

was able to maintain session throughput when the link capacity was exceeded.

When measuring throughput on a 256K bit/sec link using DLS, the throughput rates were comparable to those achieved with source route bridging. That is, the router was able to utilize more than 90% of the bandwidth when transmitting packet sizes greater than 400 bytes.

Goethals said that tests of SDLC DLS throughput have yet to be completed but preliminary results indicate that SDLC links can be fully utilized in a file-transfer environment.

With interactive applications that use 40-byte packets one way and 1,400-byte packets the other, the 6611 was able to maintain one-second response time at 70% line utilization.

Robin Layland, an engineering consultant at The Travelers Corp. in Hartford, Conn., which is a beta site for the 6611, said he is generally pleased with the efficiency of the router.

"When it comes to bridging or routing the so-called routeable protocols like TCP/IP, the box is good enough for my needs," Layland said. "But the numbers for the [SNA DLS] performance aren't as high as I'd like them to be."

Layland said this could affect how users choose to implement DLS. That is, they may need to distribute DLS at the departmental LAN level to achieve a greater number of transactions than what is possible when DLS is performed solely on a campus backbone router. □

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Radia Perlman

The inventor of the Spanning Tree Algorithm and other protocols, Perlman seeks to provide simple solutions to complex connectivity problems.

By Lucie Juneau

Simplicity isn't a concept that's usually associated with network protocols. Yet Radia Perlman, creator of the Spanning Tree Protocol and one of the world's foremost routing experts, says the idea behind the protocol really was quite simple. It came to her one night in 1984 as she was trying to get to sleep.

Earlier that day, her boss at Digital Equipment Corp., where Perlman is a consulting engineer, had asked her to develop a simple protocol that would enable bridges to locate loop-free paths through a network. The assignment included some "absurd" constraints, Perlman says. The protocol had to use a constant amount of memory and a constant amount of bandwidth, regardless of the network size.

At that time, designing bridged networks was tricky. Great care had to be taken to avoid the creation of loops — alternative paths from one point on the network to another — in order to ensure that packets wouldn't proliferate unchecked within the network and flood it with redundant information.

"Every time a bridge forwards a packet over a LAN, lots of bridges may pick it up and each may forward it in more than one direction," Perlman explains. "One packet — picked up and forwarded in multiple directions by multiple bridges — can bring down the entire network."

Perlman's Spanning Tree Algorithm takes advantage of the fact that each bridge, like every piece of equipment on a local-area network, has a unique, 48-bit identification number. Gossiping among themselves — that is, swapping identification numbers — bridges on a network can determine which of them has the lowest ID number. That bridge then becomes the root bridge, and the other bridges on the network can calculate their distances from it, Perlman says. The Spanning Tree is the tree of shortest paths from the root bridge to each LAN.

But there are some limitations to the Spanning Tree Algorithm, Perlman says. For one thing, although it provides a tree of shortest paths between the root bridges of each LAN, the algorithm doesn't necessarily provide the

best or shortest path between any two points in the interconnected network, she says.

In addition, because loops are so devastating, the protocol is designed to react very slowly when any network changes occur in order to avoid introducing loops. That means if the network fails, for any number of reasons unrelated to the existence of loops, it takes about a minute for the network to recover, Perlman says.

Despite these shortcomings, in the late 1980s, the Institute of Electrical and Electronics Engineers, Inc. made Spanning Tree the backbone of its 802.1d bridge standard. And last year, the IEEE adopted a version of Perlman's transparent bridge — the bridge that incorporates the Spanning Tree Protocol — as the industry standard. Now, when using transparent bridges, users don't have to agonize

about how they're interconnecting their LANs, Perlman says. "You don't have to worry about topology. There are no rules."

Perlman isn't entirely happy with the way the IEEE adopted her idea, however. "They modified it in annoying ways that were not improvements," she says. Since creating the Spanning Tree Algorithm, Perlman seems to have made a career of inventing network protocols. She is also the principal designer behind DEC's DECnet IV and V network protocols, and is responsible for much

of the work behind the ISO's connectionless network protocol (CLNP). CLNP enables individual datagrams to be routed through the net independently, without requiring permanent end-to-end network-layer connections.

Perlman's ability to grasp the big picture as well as its individual components distinguishes her from many other researchers in the field, says Yakov Rekhter, manager of high-performance

networking at IBM's T.J. Watson Research Center. Over the years, Rekhter and Perlman have collaborated on the development of various routing standards, including the Open Systems Interconnection's Interdomain Routing Protocol (IDRP), which specifies how routers communicate across domains.

Math maven

After earning bachelor's and master's degrees in math from the Massachusetts Institute of Technology, Perlman joined the research staff at Cambridge, Mass.-based Bolt Beranek and

Newman, Inc., where she worked on a packet radio project. In 1980, she moved to DEC in Maynard, Mass., to design routing protocols.

One of her biggest contributions was to change DECnet's routing protocol from a distance-vector to a link-state protocol.

"With a distance-vector routing protocol, it sometimes takes a long time for the network to realize that something has changed [that is, that the network has been rerouted] and to adapt to the new topography," Perlman says. "There is the potential for developing loops."

The link-state protocol, on the other hand, resets rapidly, allowing the network to assimilate topography changes and find new routes very quickly. Until Perlman introduced DECnet's link-state protocol, the only protocol of that type in existence was the link-state routing protocol found in the Advanced Research Projects Agency Network.

As part of her work on DECnet, Perlman worked with others inside and outside of DEC to enhance the Intermediate System to Intermediate System protocol so it could route other protocols such as the Internet Protocol, AppleTalk and Novell, Inc.'s Internetwork Packet Exchange (IPX). This frees the net manager from having to understand the intricacies of each protocol and results in less overhead than running each protocol separately, she says.

In 1986, Perlman returned to MIT to earn her Ph.D.

The protocol that Perlman developed for her thesis resembled the link-state protocol she had previously developed for DECnet. "I realized that if I took the cryptography out, it wound up being a simpler version of what I had done before," she says. She later replaced DECnet's original link-state protocol with the new, simplified protocol. It is now used by all link-state routing protocols to forward link-state packets around a network.

Although the idea Perlman devised for her thesis hasn't been implemented yet, there has been some interest from some parties, including the Internet Engineering Task Force, a group which establishes standards for the Internet network.

Like all of Perlman's ideas, the idea behind her thesis was "simple," as good technical ideas often are, she says. Perlman doesn't have much faith in complicated protocols. "If you get the core of the idea, the protocol will be simple," she says.

Getting the core of the idea seems to come naturally to Perlman. "She has that ability to cut through to the important part and to simplify around that," says Paulina Knibbe, a product marketing manager at Cisco Systems, Inc. who worked with Perlman on the ANSI subcommittee developing the IDRP standard.

Perlman's hopes for the future include a desire to see a movement toward the use of a single network-layer protocol. "Getting things to work together is more trouble than it's worth," she says. If the world could agree on the use of one protocol, it should be the one that would require the least expertise on the part of users and it should be very robust, she adds.

There is such a protocol available today, and that's the ISO's CLNP, Perlman says.

But while there is a consensus in the industry that moving toward one protocol is a good idea, no vendor wants it to be someone else's protocol, she says. That may make it unlikely that the world will see a shift toward a single protocol anytime soon. But in the meantime, network users and managers can take some comfort in the fact that Perlman is, as usual, doing her part to keep networking simple. ■

Juneau is a free-lance writer based in Salem, Mass.



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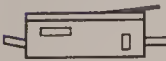
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Dr. David Stang has been teaching network security seminars for over three years in the U.S. and Europe. As Director of Research for the International Computer Security Association, he has written several books on the topic, including *LAN Security*, *Microcomputer Security*, and *Defending Corporate Information*. Before his present position, Dr. Stang was founder and Director of Research for the National Computer Security Association.